THE DEVELOPMENT AND APPLICATION OF A PROCEDURE TO MEASURE CULTURE STRENGTH IN ORGANIZATIONS

By

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(ABSTRACT)

The objectives of this exploratory research were to 1) operationally define culture strength, 2) develop a procedure for measuring culture strength in organizations, 3) and demonstrate the culture strength measurement procedure in one or more organizations. I used the culture strength measurement procedure in two organizations—a large research organization at a major university and the headquarters organization of a regional provider of life insurance products and services. I used analogies from materials engineering and psychology to help conceptualize and operationally define culture strength.

I studied the effectiveness of five culture strength measures (intensity, core values, cultural behavior, effects from external forces, and the gap between the existing and desired culture) to predict three criterion variables (employee commitment, job satisfaction, and group cohesion). I constructed my measurement instrument using mostly existing scales modified for my application. I developed a scale to measure the force-effect relationship.

I found work groups with stronger cultures had smaller gaps between their existing values and their desired values, had many people whose behavior reflected the desired values, had people whose behavior reflected many of the 53 values used in the survey

instrument, had a small set of work group values held tightly by their people, and that small set of work group values closely mirrored the set of values held tightly by all members of the organization.

I used a canonical correlation analysis for the culture strength measures at the individual level and rank order correlations for culture strength measures at the work group level. I found culture gaps and its factors (as determined through a factor analysis) were consistently good predictors of the criterion variables. Cultural behavior, a measure of the percentage of people whose behavior reflects a set of mostly positive values, was also a good predictor of the criterion variables. The effects scale was not an effective measure of culture strength in this research.

Acknowledgements

I'll never forget the Winter of '93. Laden with obstacles of all sorts, from my father's health to the "storm of the century" that dumped nearly three feet of snow, this time period was extremely trying yet extremely productive. I owe much of my productivity to my very helpful and supportive colleagues at Management Systems Laboratories.

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Though never funded, the DASMA proposal (DOE Deputy Assistant Secretary for Military Application) was a rich source of information and literature leading to my eventual research topic. My involvement with that proposal team, including Jim Hughes, Anne Doss, Scott Geller, and Kathryn Welch, was a rich educational and collegial process.

Howard Swingle and Kent Williams deserve my sincere thanks for financially supporting my research via the DP and NPR grants, respectively. Good research requires good backing and Howard and Kent ensured I had that backing so I could concentrate on my research.

MSL's graduate students both formally and informally supplied frequent and honest feedback and support. I'm most grateful to Tim Kotnour, Steve Van Aken, and George (Hon Sung) Yong for their questions and support throughout the dissertation and job-hunting process.

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Betsy McPhail supported a variety of critical tasks from travel arrangements to presentation preparation. I'm grateful to Betsy for her support and coordination of mine and Brian's schedules.

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Ellen Tomchin, Kathryn Welch, and Linda Pacifici all contributed to my work by supplying insights and techniques from their respective backgrounds and expertise in qualitative research, industrial/organizational psychology, and education. Ellen, Kathryn, and Linda all provided emotional support as I went through the dissertation process. I still remember the celebratory lunch we had at Bogen's attic as I left my full-time position in Technical Development and made the plunge to full-time student status.

Though not a formal committee member, Betty Koball played a role equivalent to a committee member. Her advice and guidance on my research was unparalleled and went far beyond the call of duty. Betty's active interest both in my subject matter and in mentoring showed a selfless regard for helping a graduate student enter the realm of academic research. This was an invaluable research partnership based on inquisitiveness and discovery.

My fellow OSL'ers (Organizational Systems Laboratory employees) were supportive and understanding of my withdrawal from programmatic work in the final months of my research so I could devote concentrated time to my work. I know this made their jobs more difficult and I appreciated their understanding.

Without the efforts of Greg Taylor, the production of this document would not have been possible in the given time frame. Greg spent many hours with me setting up a complete process for entering, checking, analyzing, outputting, and manipulating the data when SAS alone couldn't do the job. His help went beyond the technical and he suggested several content-related analyses useful in my research. Greg's can-do and will-help attitude solved many seemingly unsolvable problems. Greg was instrumental in the final stages of production and managed the document to its final form, even producing a document from diskettes I sent from the West Coast. Greg's ability to analyze a problem and design a solution with whatever means along with his pleasant attitude was unparalleled and greatly enhanced my ability to focus on content issues. With Greg, there is no such thing as a computer problem.

Brian Kleiner, my supervisor and colleague, was highly supportive of my research while paying due attention to programmatic needs. We were able to achieve synergy between my research and OSL's programmatic needs and to keep the funding flowing. Brian was a good sounding board and source of advice on professional development and faculty search issues. Brian's management of the Westinghouse Hanford work allowed for a continuous learning environment and supplied inspiration for my research. Brian's dedication to his job and his profession is admirable and reflected in the good work he does both for MSL and its people.

Dr. Paul Torgersen, Dr. Pat Koelling, and Dr. Bob Madigan were valuable members of my committee. They carefully reviewed my work and asked the tough questions that make academic work both challenging and rewarding. I'm grateful to their service on my committee.

Anne Doss has been a co-worker of mine for the past three-and-a-half years. I'm especially grateful for her successful efforts in securing funding for my dissertation research. Anne's service on my committee brought balance to research methodology issues and allowed for support and guidance on a continuous basis. I'll always remember Anne's dedication to MSL and her support of academic and professional goals.

Scott Geller taught me everything I know about psychology. Well, maybe not, but I learned an awful lot from him. Scott and I share a similar perspective on organizational change and improvement and we were able to build off each other's ideas and produce something neither one of us could have produced on our own. From the DASMA proposal to 6004 to the depths of my dissertation, Scott was always available to take or return a phone call and to share his ideas and my work has always been better because of his feedback and advice.

But much of my academic and professional progress has been due to the guidance and advice of one man—Harold Kurstedt. From the day he hosted my visit to MSL and VPI in 1984 as a potential master's student to the present, Harold has been a constant source of intellectual development and has not only allowed me to dream but to achieve those dreams. The sense of personal and academic discovery was facilitated by Harold's ability to organize resources of monumental proportion and put them to good use for the students and employees of Management Systems Laboratories. I never knew when I accepted Virginia Tech's offer to enroll in the industrial engineering master's program that

I would have received so practical and comprehensive an education as I did in my master's and doctoral programs.

Harold's integrity, honesty, and critical feedback have made learning a joy, not a pain. Not only did I learn the research process, I learned many of the essentials of being an active faculty member—how to market leads, negotiate contracts, and deliver services at high levels of quality and often on short notice. Though he leads a very busy life, he was always sensitive to my schedule and made time to meet, even if it meant meeting while driving in a car to Myrtle Beach. Harold taught me to solve problems by getting at the root issues and challenging existing ways of thinking about the problem and turning the problem into an opportunity ("turning lemons into lemonade," as he often says). I've enjoyed working with Harold as a student and now look forward to working with him as a fellow faculty member.

My family and friends deserve my heartfelt thanks for understanding the long lapses in communication because of my entrenchment in my research. Mark Stolt and Klaus Mueller were always there when I needed them, whether the need was pushing my car out of the "mud of the century" or having a beer at the Cellar. Tim and Liz Alba and the rest of my Charlotte friends I consider more as extended family than mere friends and I have taken up their Springfest and JazzCharlotte offers quite often. Radha and Usha Jayaraman are also like family and have provided support throughout this process. Bob Braun provided support from Chicago with "music-by-mail" and "beer-by mail," both valuable assets to make it through a dissertation. But the day-to-day support came from a very special woman, Jocelyn Steinke. Jocelyn's phone calls, visits, packages, cookies, clippings, support, love, hope, and enduring friendship has made life more enjoyable, memorable, and livable.

My parents, Ben and Lou, were always supportive of my graduate work. I'm forever indebted to them for giving me life and the proper means to live it—faith, hope, love, curiosity, and an upbringing based on hard work. Without these core values, so to speak, I wouldn't have had the direction, fortitude, or purpose to achieve my goals. I dedicate this dissertation to them.

Table of Contents

List of Figures

List of Tables

Chapter 1. Building the Foundation for Culture Strength Research

1.1 Introduction

The strength of an organization's culture has been cited as a key variable in predicting organizational performance (Calori & Sarnin, 1991; Denison, 1990; Kotter & Heskett, 1992). Related research has linked commitment, job satisfaction, and intent to leave with employee fit with the organization (Enz, 1986, 1988; Meglino, Ravlin, & Adkins, 1989; O'Reilly, Chatman, & Caldwell, 1991). However, from Peters and Waterman's (1982) and Deal and Kennedy's (1982) books to the present, authors have infrequently and inconsistently operationalized their concepts of strength.

The driving force behind this research is my assumption that organizations and work groups with higher culture strength will, in general, have better performance and outcomes than those with lower culture strength. This research provided an opportunity to gather evidence to use in evaluating that assumption and its implications for managing organizations.

This work was exploratory and many analyses were suggested by the data and results once the research had begun. I took advantage of opportunities to explore the data to

further add to the value of this research. I conducted these additional analyses in the spirit of exploring the role of the culture strength construct and in building the foundation for follow-on research.

My procedure for measuring culture strength was based, in part, on organizational effects from external forces, the thinking of which was derived from the concept behind stress-strain diagrams in strength of materials applications. As a key component of my conceptualization, the stress-strain diagram operationalized strength and inspired the operationalization and measurement of culture strength as forces and effects.

I used Louis' (1985) structure to guide my development of a definition of culture. Louis advocated defining culture by identifying the content of culture and the boundary for that content. Together, the content and the boundary form unique cultures. I selected values as the content of culture and the work group as the boundary for culture. The combination of a work group and its values constituted a culture (which may be referred to as a subculture). The work group was my unit of analysis for this research, although I also studied the *organizational* level of culture as appropriate (e.g., through the organization's core values).

This work explored hypotheses relating culture strength to the criterion variables and used a canonical correlation analysis to find out which culture strength measures best predicted the criterion variables[1]. I postulated hypotheses linking five measures (intensity, core values, desired behavior, culture gap, and effects) to variables believed to be predicted by culture strength: employee commitment, job satisfaction, and group cohesion. This research showed which measures were linked to the criterion variables and which measures were found not linked to the criterion variables. Therefore, regardless of

[1]See Appendix A for a more detailed documentation of research process components.

whether or not the culture strength measures I used were effective in measuring culture strength, just finding out which measures are effective and which measures are not effective is useful information.

This work prepared the way for further research. Further research will involve refining the variables and scales used for both measuring culture strength and for measuring criterion variables. My work suggested several improvements and I've documented those in Chapter 9.

1.2 Research Question

What is meant by strength of an organization's culture and how can it be measured?

1.3 Problem Statement—Goal of the Research

This research aimed to define and operationalize the concept of culture strength and to develop, demonstrate, and validate a procedure to measure culture strength. The results of these measurements can be used to compare organizations with respect to culture strength and make recommendations for moving toward a more desirable organizational culture.

1.4 Assumptions

- Organizations have cultures and these cultures can be managed.
- Organizations whose values are strongly held have employees who are highly committed to the organization (O'Reilly, 1989).

- An organization's culture is unique to that organization. A work group's culture is unique to that work group.
- We manage culture for one of two basic reasons: 1) to maintain the current culture (status quo) or 2) to change toward a desired culture.
- Organizations have an inherent drive to survive and achieve good performance. Therefore, most organizations will aspire to a desired state.
- Cultures have subcultures and these subcultures are often a function of work group affiliation, geographic location, employee classification, gender, and occupation.
- The environment produces forces acting on the organization (external forces). These forces originate in the seven environmental dimensions identified in the literature and discussed later.
- In a strong culture, an organization's core values remain relatively stable when acted on by an external force.

1.5 Desired Outcomes—Significance of the Research (or Why Study Cultures and Culture Strength?)

Organizational culture is a topic of much discussion in management today, especially its role in quality management efforts. I've previously stated my assumption that culture can be managed. Assuming culture can be managed moves the research beyond understanding organizations to developing a theory-based, research-driven method for strengthening organizational culture. My research can help managers shift their organizations toward their desired cultures and become more aligned with their environment and customers.

The culture literature recognizes the assumption of whether or not culture can be managed through its functional and interpretive works[2]. In a recent forum at the 1992 Academy of Management Meeting, a panel of culture researchers including Ed Schein,

[2]Those viewing culture from a functional perspective will tend to identify functions of culture and how those functions together constitute culture. Functional researchers typically structure their work to provide results managers can implement to manage or change their cultures. Those viewing culture from an interpretive perspective will focus more on the meaning of cultural artifacts and symbolism. Interpretive researchers typically conduct research to improve the understanding and meaning of the organization. See the literature review for a detailed discussion of culture's functional and interpretive works.

Mary Jo Hatch, Gideon Kunda, and Debra Meyerson, agreed the labeling of culture research as either functional or interpretive is a barrier to effective research and researchers should not let these perspectives greatly influence their work. I use works from both functional and interpretive perspectives to guide this research.

Many popular books and articles directed at managers (e.g., Deal & Kennedy, 1982; Peters & Waterman, 1982) advanced propositions without the benefit of formal research grounding. Such propositions include: 1) strong cultures have higher performance levels; 2) strong cultures are more results-oriented; 3) strong cultures resist change; and 4) culture strength is an all-encompassing, unitary concept. While several researchers have produced evidence supporting the link between culture strength and positive performance, there is no consensus on what is meant by culture strength and there exist varying notions of good performance measures. Whether stronger cultures are more results-oriented or whether they resist change has yet to be tested in an empirical setting. And both my work and that of Raden (1985) presented plausible arguments for viewing strength (whether culture or other type of strength) as multidimensional.

To date, empirical studies have been mostly correlational (e.g., Calori & Sarnin, 1991; Denison, 1990; Enz, 1986). These empirical studies have tended toward use of extant data and financial-based performance measures. What's needed is a way to measure culture in an existing organization, using current data, and focusing on more behavioral-based performance measures. My research addressed these needs by developing a procedure for measuring culture strength. The link between culture strength and performance is a logical next step in the research; investigation of such a link is outside the scope of this research although I will study the links between culture strength and criterion measures of employee commitment, job satisfaction, and group cohesion.

My literature review (Mallak, 1993) discusses in detail the literature regarding culture's link to performance[3]. I also reviewed several instruments for measuring culture. Many of these instruments lacked the benefit of rigorous methodology, meaning they were developed with little regard for content and construct validity and internal consistency. My review suggested: 1) relatively few organizational instruments have been based on rigorous methodology, 2) there have been no attempts to develop a research-based instrument to measure culture strength, and 3) many of the existing culture instruments are dated. Of the nine instruments I reviewed, only four of them were developed in the past six years (1987 and later). My research addressed this research and management need by developing and applying a procedure to measure culture strength, using a rigorous methodology.

The five measures of culture strength provided data on how well the organization is aligned with its desired culture, how intensely people hold the values, and a set of values having high extent of agreement. This research produced a procedure for measuring culture strength in organizations and resulted in conclusions for better ways to measure culture strength and showed how culture strength was related to the criterion measures.

1.6 Caveats in my Research

My research brought up several issues where the literature noted potential trouble spots. Rather than string these caveats throughout this document, I listed and addressed these caveats all in one section. I therefore made minimal subsequent reference to these caveats throughout this document.

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[3]Appendix B contains an extensive bibliography of literature obtained for this research.

1.6.1 The use of analogies in my research

I used a stress-strain diagram from strength of materials as an analogy for this research. I used the stress-strain diagram and its underlying relationship to help in my operationalization of culture strength. While the stress-strain diagram could supply much more than the basis for operationalizations, including even the application of equations relating stress to strain and other quantitative relationships, I limited my use to supporting my operationalization of culture strength and supplying effects responses.

Researchers have cautioned others about the use of analogies in scientific research. These researchers cited the "fundamental mistake" of using an analogy developed for clarifying thinking and making it into a reality. Others warned against using the analogy to lead to "overhasty generalizations" (Leatherdale, 1974) and in allowing the analogy to become an impediment to "fuller or more correct understandings" (Vosniadou & Ortony, 1989, p. 13). Although the reader may identify many locations where the stress-strain diagram and strength of materials analogies could be applied, I limited the application of the analogy. This not only appeased the cautions raised by other researchers, but should convince the reader of the face validity of using only limited aspects of an analogy that seem to have much broader application.

1.6.2 Strong cultures having dysfunctional values

When studying culture strength, many researchers often hold the assumption of strong cultures being functional cultures, with functional meaning better performance, higher job satisfaction, higher group cohesion, and employees who are more committed to the organization. My definition of culture strength, presented in Chapter 3, was partially concerned with the extent of agreement on values. But what happens when an organization or work group has a strong culture based on dysfunctional values? Although

labeling values as dysfunctional requires a judgment call, consider a terrorist organization. A terrorist organization could have a strong culture built around values such as anarchy, hate, and subversion. I controlled my research for this caveat by my selection of method for measuring values. The judgment of a value being functional or dysfunctional was relative to the organization being studied and is relative to the strategy of the organization. Some organizations may view a value such as "being demanding" as functional whereas others may view that value as dysfunctional.

1.6.3 No uniform conceptual underpinning

The many different culture instruments had differing conceptual models and therefore different conceptualizations of culture. They therefore measure different things. I measured culture strength, yet needed a conceptual basis for culture. I used Louis' content and boundary framework as my conceptual basis for culture. I conceptualized culture strength using core/peripheral values and the relationships suggested by the stress-strain diagram.

1.6.4 Quality of existing culture strength measures

The research on culture and culture strength has a distinct lack of: refined conceptual models, empirical research, validated instruments, and studies of links to performance other than financial measures. Readers searching for a clear line of empirical research on culture in which to place my research should recognize this caveat. To the extent possible, I investigated the body of empirical culture research.

1.6.5 Acceptance of unproven propositions

The literature has many examples of propositions concerning organizational culture and culture strength being advanced without the benefit of empirical research (cf. Deal & Kennedy, 1982; Peters & Waterman, 1982). I noted the origin of these propositions as appropriate and placed greater emphasis on empirical findings in guiding my work.

1.6.6 Engineering stress vs. organizational stress

Stress as discussed in strength of materials contexts differs conceptually from organizational stress. It is unfortunate both are called stress, but the researcher must carefully define terms to avoid confusing the reader. When I refer to stress, I'm referring to stress in terms of force/unit area on a structural member and to its organizational analog (external forces acting on the organization).

1.6.7 Can culture be managed?

Not all researchers believe cultures can be managed. The literature reflected both points-of-view, although an active cadre has published research that managers can potentially use in their organizations. I cited many of the authors who don't believe cultures can be managed because their work on understanding and describing culture was valuable to researchers holding either point-of-view. My research assumed culture can be managed.

1.6.8 Only considering external forces

In this research, I considered only external forces in the operationalization of culture strength. I did this for three reasons. First, a substantial body of knowledge exists for organizational environment components. Second, though I'm not directly measuring

internal forces, many of the internal forces can ultimately be traced to one or more external forces. The third reason for using external forces is to bound the research.

1.7 My Contribution

This research made theoretical, methodological, and empirical contributions to the study of organizational systems. My theoretical contribution consisted of a conceptual model using stress-strain relationships from materials engineering and the idea of core and peripheral traits from psychology. My definitions of culture and culture strength were important theoretical contributions.

I identified eight areas where I made a methodological contribution. First, I offered two ways to measure intensity—by using the ratio and by using just the numerator. This builds on work done by Calori and Sarnin (1991). Second, I defined core values to use in measuring culture strength among work groups. Third, I used a modified coefficient of variation to rank values to account for both the depth (via the mean) and the consistency (via the standard deviation) of responses. Fourth, I operationalized a measure to capture the behaviors reflecting the desired values. Fifth, I developed and demonstrated a new way to measure the culture gap between the existing culture and the desired culture. Sixth, I used work group-level data in my analysis. Most culture studies have used organizational-level data. Seventh, I used multiple measures of culture strength in a canonical correlation with three criterion measures. While many culture researchers have used more than one criterion measure, none to my knowledge have used a canonical correlation to reach conclusions on the effectiveness of culture strength measures with respect to each other. Eighth, I developed a scale to measure organizational effects due to

external forces. This scale was based on the stress-strain analogy and operationalized that relationship in an organizational setting.

My empirical contribution is in the application of this methodology to two service organizations and the exploration of hypotheses. Because of my affiliation with one of the service organizations (MSL), I was able to interpret their results against my expectations as built through five years of employment spread over a nine-year period. This ability was key when I investigated the findings of the intensity measure. I attempted to replicate this ability for the second service organization by asking their management to rank their work groups prior to data collection. I then used this ranking to compare results against the criterion variables.

1.8 A Guide to This Document

This document parallels the underlying research process I used. Here's a brief description of the chapters.

Chapter	**Description**
One:	Explain the problem and present the research question, assumptions, desired outcomes, caveats, and contribution.
Two:	Put the research in the context of other culture strength research, describe functional and interpretive approaches to culture and discuss my research vis-à-vis those approaches.

Three:	Present the conceptual model as constructed using stress-strain diagrams from materials engineering and core/peripheral traits from psychology. Establish the foundation for developing operational definitions and present those definitions.
Four:	Develop the methodology for measuring culture strength in organizations and for analyzing the results. Present the culture strength measures, criterion variables, and hypotheses linking the culture strength measures with the criterion variables.
Five:	Characterize the participating organizations and document lessons learned from the pre-test.
Six:	Document the situational conditions concurrent with field measurement. Measure culture strength in the first field study participant organization. Report on the sample, instrument administration procedures, and data analysis and results.
Seven:	Document the situational conditions concurrent with field measurement. Measure culture strength in the second field study participant organization. Report on the sample, instrument administration procedures, and data analysis and results.
Eight:	Integrate results of both field studies and interpret those results for measuring culture strength. Evaluate hypotheses from Chapter 4 and make recommendations for measuring culture strength.
Nine:	Review the objectives of this research, discuss the implications and limitations of this research, and offer suggestions for further research.

Chapter 2. Placing this Research in Context

I described research efforts to date on culture strength. These efforts used varying operationalizations of culture strength and I therefore found few occasions where the same independent and dependent variables were being tested. I discuss my research vis-à-vis functional and interpretive approaches to culture. This chapter places my research in the context of current culture strength research. Mallak (1993) provided a comprehensive literature review addressing the many frameworks and approaches taken by researchers to study culture in organizations.

2.1 Culture Strength Research to Date

Several authors have defined culture strength for their work and research. In general, these definitions have not been based on solid conceptual models; several definitions rely on statistical manipulations of survey response data to define culture strength. The statistical manipulations ignored the magnitude dimension suggested by the word strength and emphasized measures of dispersion. My conceptual model for culture strength (presented later) considered both the concept of core and peripheral values and the effect of forces acting on the organization.

Researchers operationalize their definitions of culture and culture strength differently, and I discuss several of the more prominent definitions found in the literature. (See Mallak (1993) for a detailed discussion of my operational definitions.) Rousseau (1990, pp. 180-181) didn't hit culture strength head on, but approached it through consensus: "Where consensus is tested, results question the generalizability of the notion that organizations have a strong pervasive dominant culture. Rather, data suggest that organizations may in fact be strongly subcultural, with behavioral norms operating at the level of the subunit." She described *intensity* as "the extent to which members of a unit agree on the norms, values, or other culture content associated with the unit." She described *integration* as "the extent to which units within an organization share a common culture." O'Reilly (1989) saw culture strength as consensus and intensity of shared values, where intensity refers to the amount of approval or disapproval attached to an expectation. Kotter and Heskett (1992) said culture strength consists of known values and strong tradition. Denison (1990) saw strength as consistency in responses to survey and/or instrument items. Denison used the inverse of a standard deviation measure to quantify culture strength. French researchers Calori and Sarnin (1991) viewed culture strength as homogeneity of responses and intensity of cultural components such as values. Their homogeneity measure was similar to Denison's consistency measure. Their intensity measure is calculated using the ratio of mean agreement scores for the ten most characteristic values to the mean for their entire set of 60 values. Harrison and Carroll (1991) ran a simulation study where they operationalized culture strength as cultural stability. Harrison and Carroll found cultural stability increased in organizations experiencing rapid growth or high turnover. Their explanation for high turnover's improvement of stability was those people who fit the organization's culture the least

would be more likely to leave the organization. I've shown these strength-performance relationships in Figure 1.

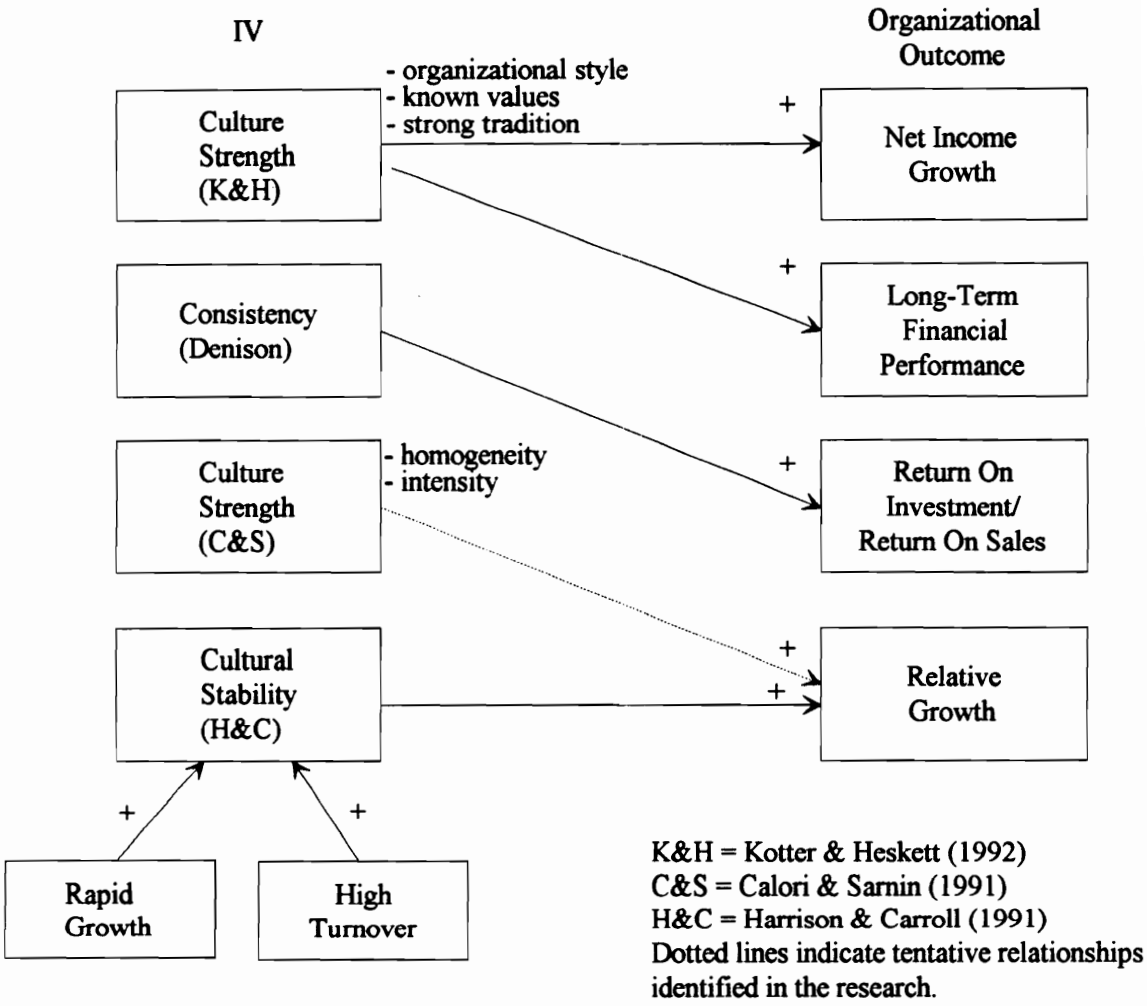

Figure 1. Culture strength has been correlated with several organizational outcomes.

These researchers discovered several findings related to their conceptualizations of strength. Figure 1 illustrates the various relationships researchers have empirically established between culture strength and performance measures. These relationships have been described in more detail elsewhere (Mallak, 1992). Kotter and Heskett (1992) found culture strength positively correlated with net income growth and long-term financial

performance. Denison (1990) operationalized culture strength as consistency of responses to items and found response consistency correlated positively with organizational performance. Therefore, the more consistent the responses, the higher the organizational performance measures. This effect was only noted for the short term (1-3 years). Denison used return on investment (ROI) and return on sales (ROS) as measures of organizational performance. Calori and Sarnin (1991) found culture strength positively correlated with an organization's growth relative to the industry.

Harrison and Carroll (1991) found cultures become stronger during periods of downsizing or decline. They defined culture strength as the mean level of enculturation of organizational members[4]. Because they've conducted a simulation study, no instrument or indicator exists for measuring enculturation—values are taken from a postulated distribution. Harrison and Carroll attributed this strengthening effect to the dynamics of attrition (junior staff and others with least fit and socialization to the organization are traditionally let go) and not to behavioral reactions to the decline. Harrison and Carroll also observed that "rapid growth and high turnover often aid in establishing cultural stability" (p. 577). Figure 1 shows the work by Calori and Sarnin (1991) and Harrison and Carroll (1991) both supporting a relationship between culture strength and relative growth.

The following authors presented observations and informed opinions on culture strength as opposed to the research findings presented earlier in this section. Peters and Waterman (1982) described strong cultures as those where people rely less on formal procedures and tend to be closer to the customer. "In these companies, people way down the line know what they are supposed to do in most situations because the handful of

[4]Harrison and Carroll operationalized enculturation as management providing intensive orientations for new employees, systems of employee participation, and comprehensive reward systems using recognition and approval.

guiding values is crystal clear" (pp. 75-76). O'Reilly (1989) stated strong cultures typically had only a few strongly held core values and "people throughout the organization must be willing to tell one another when a core belief is not being lived up to" (p. 14). Deal and Kennedy (1982) said in a strong culture, "everyone knows the goals of the corporation and they are working for them" (p. 4); "A strong culture is a system of informal rules that spells out how people are to behave most of the time" (p. 15); "A strong culture enables people to feel better about what they do, so they are more likely to work harder" (p. 16).

Wiener (1988) addressed culture strength in discussing the strength of an organizational value system in terms of an intensity index and a breadth index. Wiener's intensity was determined by: 1) calculating mean level of agreement with each value separately across all members and 2) averaging the agreement means across the central values, adjusted by the values' relative importance weights. The obtained overall mean indicated the intensity of membership agreement with the value system (i.e., culture). The breadth index was determined by the relative number of members who didn't hold the central values. Wiener said any value with a mean score higher than neutral should be considered in agreement with the population being measured. Wiener suggested a ratio determined by the number of key values held by members (i.e., the sum of values held by each member across all members) out of the maximum number of values that could be held by all members (i.e., total of key values multiplied by the number of all members). Wiener didn't give a specific method for identifying which values should be considered key values. (Wiener fogged his discussion by referring to key values, core values, and central values without carefully defining nor differentiating the meaning behind these three types of values.)

My operationalization of culture strength didn't focus on one particular measure. Rather, I used five different measures to operationalize culture strength and designed my methodology to test the effectiveness of these five culture strength measures. My measures reflected several of the culture strength measures discussed earlier, including intensity and consistency. My measures gave an empirical edge to the concepts of culture strength suggested by Deal and Kennedy (1982), Peters and Waterman (1982), and Kotter and Heskett (1992). Therefore, my application of culture strength into five measures covered several approaches to culture strength and my analysis of the results using those measures provided indications of their effectiveness. I related these culture strength measures to more proximal outcome measures: commitment, job satisfaction, and group cohesion. These proximal criterion measures will later help in setting up the linkages between culture strength and more distal measures such as productivity, quality, safety, and financial measures.

2.2 Placing my Research in Context of the Literature

My research sought specifically to measure culture strength, rather than to define and analyze culture strength as a byproduct of research focusing on culture. I used five different measures of culture strength and I used my research process to help determine which of those five were the most effective measures of culture strength. The authors discussed in the previous section tended to use one measure of culture strength and use it exclusively within a particular study.

Academic research on culture falls into one of two general orientations: functional or interpretive. I discussed these orientations in detail in Mallak (1993), but I offer a brief

description here to facilitate my discussion. Functional researchers believe culture can be measured, managed, and changed. The functional view treats culture as a variable (or a class of variables), whether dependent or independent. The interpretive view treats culture as something an organization *is*, while the functional view treats culture as something an organization *has* (Smircich, 1983). Morgan, Frost, and Pondy (1983) characterized the differences between the functional approach and the interpretive approach:

> Both approaches seek to identify and document the various symbolic forms through which the culture of an organization expresses itself, and identify the patterns of subjective meaning embodied in the content and context of cultural practice. The functionalist researcher then typically seeks to discover the role which each aspect of cultural practice plays in sustaining the culture as an ongoing system.... This perspective is inherited from anthropology.... The interpretive approach on the other hand takes the existence of all aspects of the culture as problematic, and seeks to understand the methods and practices by which its elements are created and sustained through ongoing interpretive processes, which construct and reconstruct the culture as a realm of significant meaning. From the interpretive point of view significant meaning is embodied in the symbolic actions which create the culture; from the functionalist perspective these symbolic actions are viewed as means oriented to the wider end of system survival (p. 19).

My interest in researching culture strength is to help managers and academics understand culture's role in behavior and performance outcomes. Culture researchers discussed earlier (e.g., Denison, 1990; Kotter & Heskett, 1992) sought to link culture with financial performance measures for the entire organization. I set up linkages between culture strength and more proximal measures at the work group level. These proximal measures were the criterion variables I measured using the instrument and included employee commitment, job satisfaction, and group cohesion.

I constructed a table demonstrating the key differences between functional and interpretive approaches to culture (Table 1). I walk the reader through several rows of this table to illustrate my research has a mostly functional perspective.

My research purpose, stated in the pre-proposal document in Appendix A, emphasized the definition and measurement of culture strength to help in studying the relationships between culture strength and organizational variables so we can ultimately

Table 1. A comparative framework highlights the key distinctions between functional and interpretive approaches to culture.

	Approach	
	Functional	**Interpretive**
Purpose for studying culture	understand, manage, change, predict	understand, interpret
Tools and techniques used	vision implementation organizational change strategies behavior management	ethnography
Organizations (have, are) cultures	have	are
Common frameworks	managerial quadrants	organizational stories
Intellectual roots (disciplines)	management, engineering	anthropology, sociology
Role of culture metaphor	little	critical
View of culture change	planned, rational	emancipatory
Can culture be managed?	yes	maybe so, maybe not
Role of top management and founder	pervasive, continues beyond founder's departure	mostly historical
Origin of analysis categories	researcher-driven	setting-driven
Major theorists / Proponents	Peters & Waterman, Deal & Kennedy, Hampden-Turner, Trice & Beyer	Martin, Siehl, Pettigrew, Smircich

measure the effect of interventions to change organizational culture. My purpose reflected the interpretive approach's desire to understand culture, yet my purpose clearly followed the functional approach in measuring, managing, and changing organizational culture.

2.2.1 Tools and techniques used

My research fell between the functional and interpretive approaches when considering tools. My goal was first to understand culture, then to change it. While I didn't spend days or weeks in my field organizations (as in the interpretivist's ethnography), I took care to characterize the field organizations' current situations.

2.2.2 Common frameworks

I used frameworks corresponding to the types of tools and techniques employed. My instrument didn't allow me to capture organizational stories nor did it require me to categorize cultures into managerial quadrants. However, my culture strength measures led to managerial quadrants where two variables could be compared at two or more levels each. (See Hampden-Turner (1990) for a quadrant framework using Deal & Kennedy's (1982) risk and feedback.) For example, I constructed matrices combining the intensity and core values measures to gain greater insight to the cultures of the organizations studied.

2.2.3 Intellectual roots

Interpretive approaches have been used more heavily in anthropology and sociology, while functional approaches were more likely to be used in management and engineering. I approached the topic of culture strength from an industrial and management systems engineering perspective and accessed bodies of knowledge primarily in industrial

engineering and management. My research contained many of the elements of the engineering process as practiced in management systems engineering[5]. These elements included the iterative nature of this research, the balance between qualitative and quantitative methods, emphasis on the application system, and measures relatively close to operations and behavior. The management and engineering roots for this research branched to the adoption of functional assumptions (i.e., culture can be managed) and the design of research based on those assumptions.

2.2.4 View of culture change

Interpretive researchers view culture change as something management does to employees because management has the power to do so. Functional researchers view culture change differently; they view culture change as planned and rational. In the functional view, all employees have a role in culture change and these roles may be enhanced through empowerment mechanisms. My research assumed once we learn more about the relationships between culture strength and performance, we can use this information to manage culture to improve performance.

2.2.5 Origin of analysis categories

Interpretive researchers derive their analysis categories from their extensive interaction with the organization and its setting. Their goal is more to understand a case in depth than to transfer techniques from setting to setting. Functional researchers bring in their own analysis categories, often derived from smaller engagements with similar

[5]Management Systems Engineering (MSE) is an option within the Department of Industrial and Systems Engineering at Virginia Tech. Not only is MSE an option for students, MSE is a discipline involving the application of engineering processes and techniques to management. Dr. Harold Kurstedt at Virginia Tech essentially founded MSE and has been currently documenting the MSE body of knowledge in draft textbook form.

organizations (perhaps through pilot studies). Armed with these predetermined analysis categories, functional researchers can compare results from one organization to another with very little transformation required. My work used researcher-driven analysis categories in the form of existing and constructed scales.

2.2.6 Summary

While this analysis using Table 1 demonstrated my work uses a mostly functional approach, I didn't constrain myself to all the assumptions and techniques of functionalism. I employed interpretive assumptions and techniques where appropriate as long as they didn't violate other assumptions I made. My goal was to use tools and techniques to the extent they support my research—functional, interpretive, or whatever.

Chapter 3. Conceptualizing Culture Strength

I drew from engineering and psychology to help conceptualize this research. From materials engineering, I used the relationship between stress and strain as the partial basis for my culture strength operational definition. From psychology, I used the concept of core and peripheral traits to help in the understanding of core and peripheral values and to inspire one of my measures of culture strength. I looked to several disciplines for how they define and measure strength. Finally, I offered operational definitions for culture and culture strength.

3.1 Analogies in Scientific Work

My conceptual model used an analogy from strength of materials[6]. To justify the use of the stress-strain diagram and other concepts from strength of materials, I examined several sources in the literature for definitions, typologies, and guidelines for using analogies. I identified implications of the use of an analogy for my research. The details of this investigation of analogies can be found in Appendix C.

[6]The decision to apply an engineering model (stress-strain diagram) to a management problem (measuring organizational culture strength) was inspired by discussions between Pedro Mendes and Harold Kurstedt on defining management systems engineering. These discussions led to my decision to examine strength of materials for concepts and relationships to transfer to the measurement of culture and culture strength.

The analogy served two purposes: 1) to clarify the researcher's thinking and 2) to help the researcher conceptualize—to define and describe the analogy for his or her purposes. I wanted to investigate the different types of culture strength an organization may have. In strength of materials we have yield, ultimate, and failure strengths. My assumption was an organization also has several different kinds of strength. My operational definition of culture strength considered two different kinds of culture strength.

3.2 Stress-Strain Diagrams

I used a stress-strain diagram to help operationalize my culture strength definition and to set up a relationship analogous to forces and effects. But why use a stress-strain diagram? Does an organization have stresses and strains like engineering materials? I examined several disciplines and their operationalizations of strength before settling on the strength of materials operationalization. I examined ergonomics, electrical engineering, chemistry, and social psychology. I found the strength of materials operationalization of strength the most appealing and bearing the greatest potential for helping my research because of the stress-strain relationship being an analog of the force-effect relationship in culture strength. The discussion in this section builds the case for my use of a strength-of-materials analogy in this research.

The stress-strain diagram operationalized the notion of strength in materials testing. In fact, several different kinds of strength were derived from the diagram. (See Figure 2.) The yield strength represents the point where the material "gives," and small increases in the load beyond the yield point produce large amounts of deformation or strain. The

ultimate strength represents the greatest amount of force or stress the material can endure before beginning the path to the failure point. In strength of materials, stress is force per unit area and strain is change per unit length. The organization experiences forces resulting in organizational change—the effects of those forces. A detailed discussion of the stress-strain diagram's role in my research can be found in Appendix D.

At least four types of issues from strength of materials apply to organizations through the stress-strain diagram analogy. First, different types of forces act on the organization, just as they do in a materials context. These forces are presented in detail later, but they

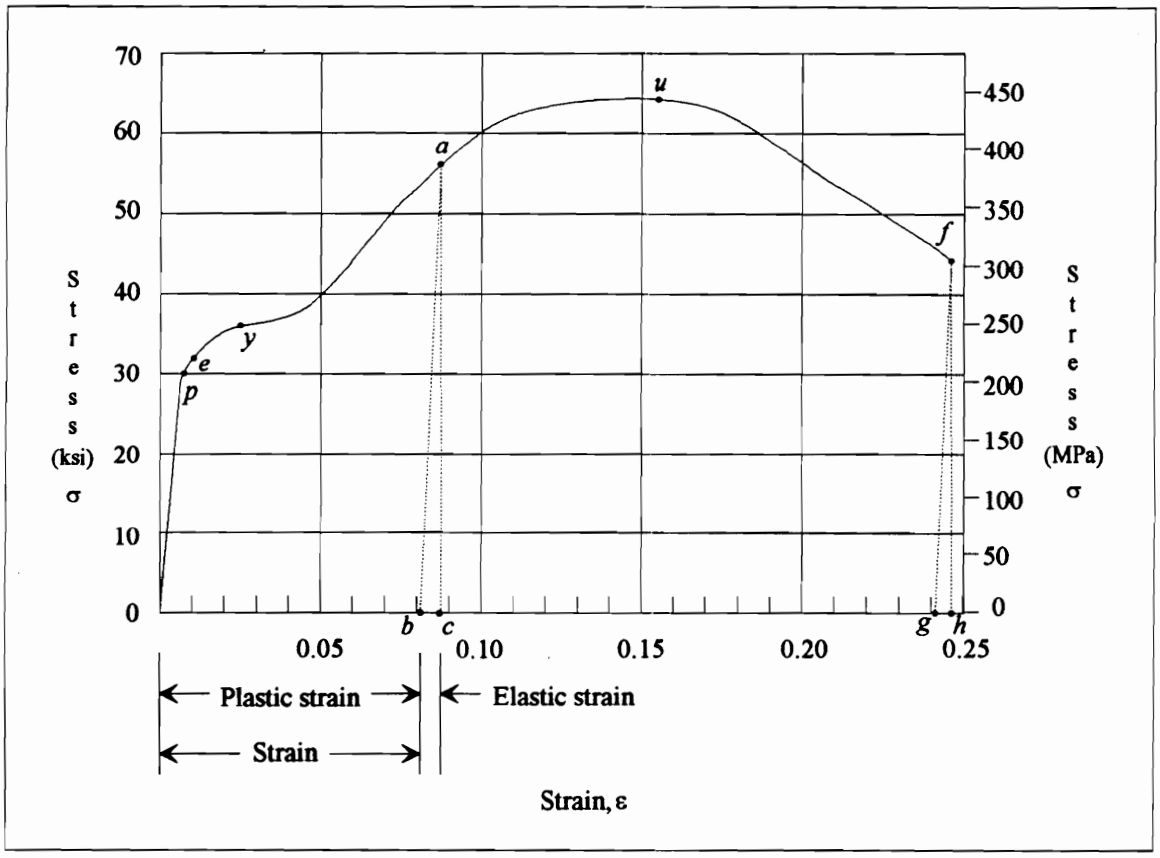

Figure 2. In strength of materials, a stress-strain diagram illustrates the operationalization of strength (*from Cheng, 1986, p. 54*).

include those originating in the environmental dimensions of competitors, suppliers, customers, regulators, and others. Second, different types of loading are experienced by organizations and materials. Materials experience tensile, compressive, and torsional loadings as well as combinations of these three basic forms of loading. Organizations experience forces opposed to each other, aligned with each other, and a combination of the two. Third, different types of effects are experienced by organizations and materials. The material experiences elastic and plastic deformation, yield, and failure. The organization may experience some analogous effects, but it will produce an effect or set of effects from application and loading of forces. Fourth, different types of consequences result from forces being loaded and effects produced. The material experiences fatigue, strain, yield, or failure. For the organization, the consequences involve what the organization changes to as a result of forces.

3.3 Core and Peripheral Traits

I borrowed the notion of central and peripheral values from the personality literature in psychology. While psychology studies central and peripheral *traits* as possessed by *individuals*, I study central and peripheral *values* as possessed by *work groups*. I used the structure and underlying theory to help build my conceptual model for researching culture strength.

Sawrey and Telford (1975) reported Cattell's (1946, 1973) definition of source traits and surface traits. Surface traits are the "overt manifestations of personality that change with environmental circumstances, whereas source traits are the more basic, underlying components of personality" (Sawrey & Telford, 1975, p. 498). Using this psychological

formulation in my research, I used the idea of core values to be analogous to source traits and peripheral values to be analogous to surface traits.

Core values are the basic, underlying components in which organizational behaviors are rooted. These core values are more permanent and tend not to change much over time, even as people come and go through the organization or work group and even under the application of external forces. Schwartz (1978, quoted in Raden, 1985) supported this by stating more stable attitudes are stronger attitudes. Schwartz says attitude strength is related to durability at the conceptual level and this durability can be operationalized by repeated measures. My study didn't allow for repeated measures, so I used an organizational effects scale to elicit responses from a hypothetical perspective. Translating this idea to culture, the core values should remain stable in stronger cultures. Stability can be studied in terms of consistency across respondents and across time. My research was limited to studying core values in terms of their stability across respondents. When my

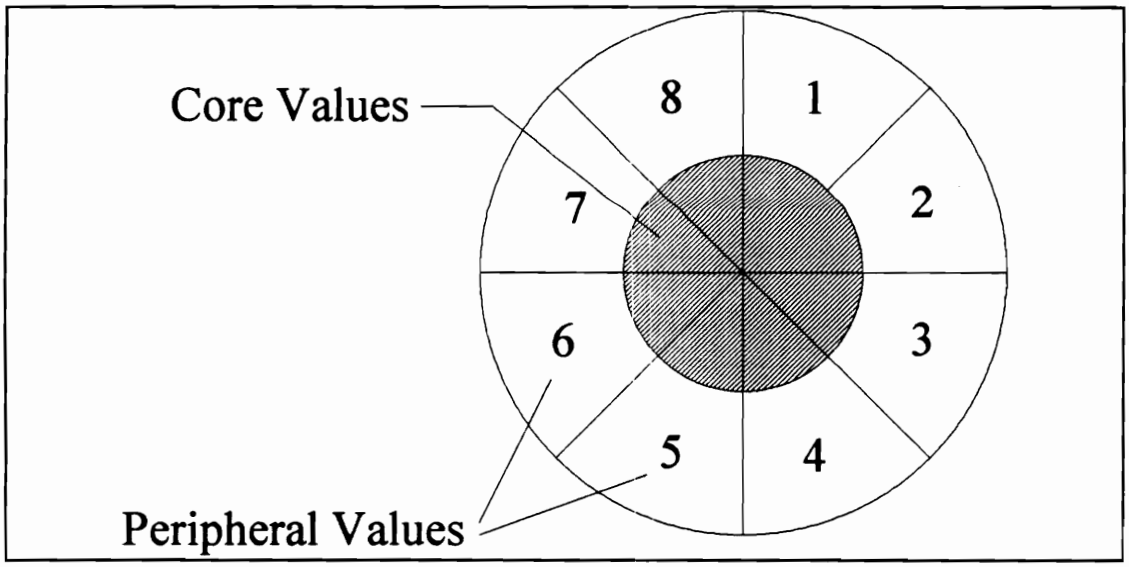

Figure 3. Core values are central to the organization while peripheral values differ by work group. (The numbers 1-8 correspond to work groups.)

research is extended across time, I'll have data for stability both across respondents and across time.

Rousseau (1990) mentions an idea similar to core values with *integration* which she defines as "the extent to which units within an organization share a common culture" (p. 182). Her notion of common culture is what my research calls core values. Peripheral values tend to change with changes in environmental dimensions and therefore differ by work group because of the different environments of these work groups. (See the conceptual model for core and peripheral values in Figure 3.) I studied core values for their consistency in being held by work groups throughout the organization. My use of the stress-strain relationship in operationalizing and measuring culture strength introduced environmental dimensions to the culture being studied.

I assumed subcultures form around work groups. I focused on culture at the work group level with some aggregation at the organizational level. Although other types of subcultures exist (e.g., employee classification, occupation), an investigation of these subcultures was outside the scope of this research.

The relationships between forces and effects as used in my conceptual model have roots in the organization-environment literature of the seventies. The next section draws from that literature to analyze forces and effects in organizations.

3.4 Forces and Effects in Organizations

The subject of forces and effects in organizations is rooted in the works of Aldrich (1979), Daft et al. (1988), Duncan (1972), Lawrence and Lorsch (1969), Tung (1979), and others. These authors studied the organization and its interaction with the

environment as well as analyzing dimensions of the environment. Tung (1979) even suggested studying dimensions of an organization's environment as stimuli affecting organizational actions: "Each of these factors and components comprising the environment could be treated as a stimulus to which the focal unit is exposed and which may, alone or in conjunction with several others, elicit or affect the action taken by that unit" (p. 674). Tung's stimulus was analogous to force in my model and the action was analogous to effect in my model.

Duncan (1972) defined environment as the social and physical factors considered in decision making outside the organization's boundary. He offered a set of environmental factors and components which others have modified and used in their research (Daft et al., 1988; Li, 1990). Li (1990) said researchers assume the perception of information is an intervening link between the organization's environment and resulting organizational activities. Li added suppliers to Daft et al.'s (1988) set of environmental sectors. Li's final set contained competitors, customers, suppliers, technological, regulatory, economic, and social-cultural (Figure 4). I assumed forces acting on the organization originated in the environment's seven sectors. For reasons I detailed in the caveat section, I considered only external forces.

More recently, Trice and Beyer (1993) built on the work of Scott (1987) in defining their two major sectors of organizational environments. These sectors are instrumental and institutional. The instrumental sector "refers to those parts of the environment with which organizations exchange goods and services for needed inputs" (Trice & Beyer, 1993, p. 304). Examples of organizations highly dependent on the instrumental sector are utilities, banks, and manufacturers. The institutional sector "refers to the written and unwritten rules and regulations to which organizations must conform in order to maintain legitimacy in the wider society" (Trice & Beyer, 1993, p. 304). Examples of organizations

- **Competitor**
- **Customer**
- **Supplier**
- **Technological**
- **Regulatory**
- **Economic**
- **Socio-cultural**

Figure 4. Forces acting on the organization originate in the environment's seven sectors.

highly dependent on the institutional sector are hospitals, legal agencies, and schools. These sectors are not mutually exclusive—Trice and Beyer put them in a matrix with "stronger" and "weaker" as the two levels of each sector[7]. Utilities, banks, and hospitals have both strong instrumental and institutional sectors.

3.4.1 Forces

The next step was to build a set of forces and an instrument to capture these based on the sectors and guided by Tung's comment about the stimuli and actions. I first operationalized what I mean by a force. In strength of materials, a force has both magnitude and direction. Magnitude relates to the size of the force, whereas direction suggests an underlying orientation. Using Lewin's (1938) force field analysis as an example of forces applied to organizations, forces are either driving or restraining. Driving forces tend to motivate behavior and change in the desired direction, thereby helping the intervention implementation. Restraining forces tend to motivate behaviors working against the desired behaviors and in the direction opposite to the intervention. The existence of multiple force fields in an organization suggests forces may be operating in more than one dimension. Weisbord (1991) and Sink and Tuttle (1987) have cited and

[7]Trice and Beyer do not define what they mean by "strong" or "weak" in reference to these environmental sectors.

applied Lewin's force field analysis[8] as a tool for designing organizational interventions. Most organizational behavior textbooks include force field analysis in their discussion of organizational development.

Although I've suggested using environmental dimensions as presented in the literature to drive the identification of forces, I needed a definition of force to decide whether or not to include items originating in the specified environmental dimensions. *Webster's Ninth New Collegiate Dictionary* defines force as a "cause of motion or change; active power." This suggested several criteria. First, the force must be the cause of motion or change. This suggested the force causes change (i.e., an effect) in the organization and demands decision making and action. Second, because I'm considering external forces, the force must be linked to one of the seven environmental components the literature says affect the organization.

I diagrammed my version of a force field analysis in Figure 5. The "Existing Culture Line" replaced Weisbord's "Status Quo" line. I included a "Desired Culture Line" to illustrate the culture gap. For now, the length of the culture gap arrow is undefined. I have all forces acting on the existing culture, because I measured the forces within the context of the existing culture. Measuring these forces as they act on the desired culture (a conceptual creation) as compared to measuring them as they act on the existing culture (a current perception of reality) would be very difficult and less meaningful since we typically define change and action plans based on the current state of the organization.

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[8]Weisbord (1991) has dramatically simplified Lewin's (1938) force field analysis for application to specific problems. Lewin refers to "driving forces" and "restraining forces," but his examples are complex and represent a geometrically-driven "topological psychology." Lewin's force field analyses often had several goals and noncollinear forces. Hence, Lewin's force field represents what he calls a "totality of forces." Lewin's treatment of psychological forces borrowed from physics—he spoke of force as a vector and addresses the resultant of several forces acting at once. Sink and Tuttle (1987) have further simplified the force field concept.

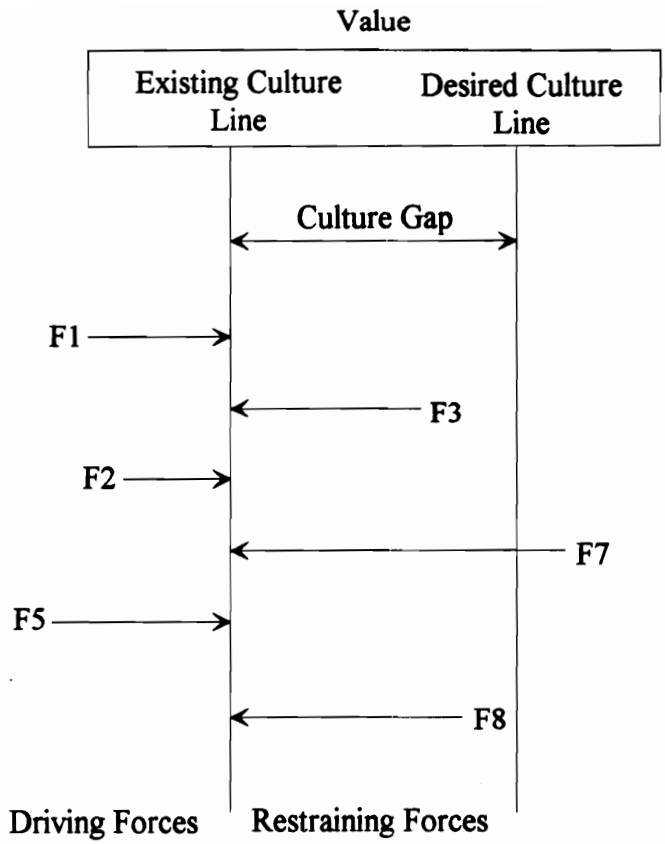

Figure 5. I've modified force field diagramming to suit the study of external forces acting on an existing culture.

3.4.2 Effects

As specified in the criteria for forces, a force must demand action and impact the organization. The effects of forces acting on the organization are mediated by several factors. First, the environmental component must produce what is perceived to be a force, according to the definition of force. Second, the perception of information is an intervening link between the force and organizational effects (Li, 1990). The level of uncertainty associated with the force-effect linkage has been the subject of a long line of research (Daft et al., 1988; Dess & Beard, 1984; Duncan, 1972; Tung, 1979).

Once I developed my operational definitions and developed the response set for effects, I abandoned my analogy and left any additional uses of the analogy to my interpretation efforts and to follow-up research. I limited my use of the materials analogy to defining culture strength operationally through the relationship of stresses and strains and inspiring response categories for effects. The analogy fed the development of my conceptual model and was an aid to developing operational definitions and measurement scales.

3.5 Operational Definitions

In this section, I construct and present operational definitions for culture and culture strength. I placed the details of the operational definition construction in the literature review (Mallak, 1993). This section contains a summary of the process for developing these definitions, as well as the actual definitions. These operational definitions were crucial to my research since my measurements were driven by how I operationalized these terms. The literature did not provide common accepted definitions like those existing for other constructs (e.g., leadership style, intelligence). My operational definitions were important results of my research effort.

I took careful steps in my construction of operational definitions. For both culture and culture strength I followed essentially the same format. I first identified and described relevant themes in the definitions as found in the literature. These themes went below the surface of definitional components and hinted at relationships among the components and the basic underlying structure of the definition. I then developed operational definitions

for culture and culture strength. I put the details of developing these definitions in a separate literature review (Mallak, 1993).

3.5.1 Culture operational definition

I operationalized culture for my research as: *the set of values (the content) common to a work group (the boundary)*. I now discuss the background behind this operational definition.

In this research I consider *organizational* culture, as opposed to societal culture, national culture, ethnic culture, or other types of culture. The culture definitions presented here represent attempts to define organizational culture, although some may have their roots in other culture types. I used the term *organizational culture* to differentiate from societal or ethnic culture rather than to emphasize a certain level of analysis (i.e., organizational). For example, when studying the culture of work groups, I studied their organizational culture and not their societal or ethnic culture. A second distinction in these definitions was the perspective taken by the researcher (or the particular piece of research). Two basic perspectives exist in cultural research, the functional and the interpretive. Those viewing culture from a functional perspective will tend to identify functions of culture and how they together constitute culture. Those viewing culture from an interpretive perspective focus more on the meaning of cultural artifacts and symbolism. I shared these perspectives with the reader merely as introductory guidance for reviewing the definitions.

The particular themes I identified in the literature were levels, patterns, foundation, collectivity, and precedence. Levels reflected the notion of stratifications as represented in models or pictorial representations of culture. An example is Rousseau's cultural onion in

the literature review discussion on operational definitions. Patterns refer to the uniformity of response of people to organizational stimuli. The foundation theme supplied the basis for producing patterns of values, beliefs, and/or behavior. Collectivity stressed the important distinction of culture as a construct hinged on the responses of many as opposed to the responses of one. The precedence theme suggested cultures learn and build on tradition.

The culture definitions in the literature review have several common themes and have many overlapping components. Barley (1983) noted all culture studies, regardless of theoretical origin, employ reasonably similar terms and constructs. Indeed, my selection of definitions showed common themes of levels of culture; patterns of values, beliefs, or behavior; culture as the foundation for behavior; shared or collective attributes of culture; and precedence as the basis for traditions and organizational learning. Several of these themes were present in my definition of culture.

I conceptualized organizational culture as a state. As a state, organizational culture has state variables. One of these variables is culture strength. Other potential state variables for culture could include excellence (Peters & Waterman, 1982), leadership (Schein, 1985), participation (Schonberger, 1992), empowerment (Mallak & Kurstedt, 1991), stability (Harrison & Carroll, 1991), and ambiguity (Martin & Meyerson, 1988). State variables for a particular system are the minimum set of quantities completely describing the system if: 1) we know the initial values of the state variables, 2) we know the values of the input sequence, and 3) we can determine the values of the outputs and the state variables at any point in time (Mendes, 1990). I used the conceptualization of culture as a state not so I could determine variable values and write equations but to emphasize culture has a dynamic element and my measurement instrument represents a snapshot (i.e., the state) of the organization's culture at a point in time. By analyzing the

state over time, we can witness change with respect to culture strength (and other state variables) and of moving toward the desired culture. These snapshots should also show the relatively constant (or static) elements of culture through an examination of culture over time.

A snapshot without any other information would not lead to a realistic view of a system or organization. A snapshot with information about the initial state (situation description), ongoing processes (self-managed teams, performance feedback to employees), and knowledge about the future (strategic plans, industry trends, regulation) allows a basis for predicting where the system will be in the future (i.e., its state). By Mendes' definition, a snapshot with the accompanying information I've described here constitutes a state in engineering control theory.

Stability implies consistency across time and consistency across respondents. For this research, I defined core values in terms of their consistency across respondents. If I repeat my measurement later in time, I can address the consistency of core values across time. Values, according to Enz' (1986) paraphrasing of Rokeach, are enduring beliefs and therefore imply consistency over time. The range of this consistency is open to interpretation. However, managers are usually interested in managing and changing culture and my procedure provided information for the culture change process. Therefore I interpreted the stability of core values as meaning the core values aren't likely to change much in the short-term, although management interventions and external forces may cause changes in core values beyond the short term. These are general observations of organizational change; certainly some organizations are apt to experience changes in their core values over the course of a year or two.

Despite the dynamic nature of culture, I believe cultures have a relatively stable set of values operating at the organizational level. I do not expect these "core values," as I refer to them later, to change much in the short term (1-3 years). However, as cultures change through deliberate attempts (culture management) and on their own, these core values should also change. An intervention strategy to reinforce desired behaviors should work, over time, to change the values underlying those behaviors because individuals will want to overcome the dissonance between values and behaviors. Therefore, my snapshot to characterize culture as a state should produce a relatively stable set of core values operating at the organizational level, yet the stability of those core values will be a function of management intervention and external forces.

The levels theme suggested structures for culture definitions. As such, authors addressing the levels theme supplied a basis for constructing a definition for culture. I adopted Louis' (1985) structure in constructing my definition of culture and this biases me toward the levels theme. Louis' structure for a culture definition required content and a boundary. Louis' use of levels emphasized a systems approach to culture and culture definitions because of the systemic relationships between the content of culture and those holding that content. Louis said most researchers have followed the lead of anthropologists and defined culture solely in terms of content. She said this is fine for remote and isolated settings where we're safe in assuming the culture is rooted in the setting. Louis added geographical and historical isolation had alleviated much of the need to source certain distinctive shared values. In organizational research, we don't typically have geographic and historical isolation, so we need to establish the sources and bounds of culture to determine the group whose culture is at issue.

Content. In this research, I considered the content of culture to be the system of organizational values. My conceptual model showed these values can be either core

values or peripheral values. Core values should be common to the entire organization while peripheral values may vary by work group.

Boundary. I bounded culture by focusing on the work groups operating within the organization. To study a culture, we must put a boundary around the culture or we won't know what's inside the culture from what's outside the culture. The boundary in this research was the work group. Unique cultures are formed by the combination of values (content) and work group (the boundary).

I constructed the culture definition after careful consideration of others' definitions, paying attention to the themes I identified among those definitions. Norms, traditions, and patterns of behavior are often considered by many as cultural content. I considered values as the content of my culture definition. People and values are related through attitudes toward those values, patterns of behavior based on those values, and traditions of group interpretations of those values.

I previously stated I consider an organization's or a work group's values the content of its culture. Whereas I acknowledge other components of culture, such as norms and traditions, I followed the lead of other researchers who have studied culture by focusing on values (Enz, 1986, 1988; Meglino et al., 1989; Wiener, 1988). The boundary placed on the culture content by work groups produces unique cultures. My operational definition of culture, as stated at the beginning of this section is: *the set of values (the content) common to a work group (the boundary).*

3.5.2 Culture strength operational definition

My operational definition of culture strength set up my five measures. Since one of my expectations for this research was to determine which of the five measures were most

effective in explaining variance in the chosen criterion variables, I gained knowledge for improving the operational definition of culture strength. *This operational definition is two-fold and each type of culture strength corresponds to the two basic models in my conceptualization. From the core/peripheral values model, I operationalize culture strength as the extent of agreement on values held by members of work groups and their organizations. From the stress-strain diagram, I operationalize culture strength as the ability of the work group or organization to withstand external forces.*

I measured culture strength by obtaining extent of agreement responses for values from several perspectives and then comparing those responses with other referents. For example, I obtained responses by work group for the values characteristic of the existing culture. I calculated an intensity measure and a consistency measure using the responses on values for the existing culture. I compared those responses to those for the desired culture and for behavior reflecting those values.

To understand the general concept of strength, I turned to several disciplines to see how they operationalized strength. I did this to see if the operationalization of strength and the resulting measuring capability would be transferable to my definition. I looked at strength of materials, ergonomics and weightlifting, electrical engineering, social psychology, and organizational culture. From these disciplines, I derived a set of themes for culture strength just as I did for culture. The literature on strength (as related to my application) was very limited compared to the abundance of literature on culture. As a result, the identification of themes was more difficult. I briefly discuss how other disciplines have operationalized strength, how others have operationalized culture strength, and offer my definitions for culture strength. The details of my deriving the culture strength operational definition can be found in Mallak (1993).

I presented a summary of the strength dimensions by discipline in Table 2. In ergonomics, the force of human exertion results in work and muscle development. In electrical engineering, the force of a signal results in the signal's transmission. In social psychology, a stimulus can lead to a changed attitude or behavior. In meteorology, storms cause a changed environment whether for the worse (as in the case of tornadoes or hurricanes) or for the better (as in the case of a spring rain shower). As mentioned throughout this document, in strength of materials the application of force on a material specimen produces stress causing deformation in the form of strain. My investigation and resultant discussion consistently showed the presence of a force, whether in the form of stress, human exertion, or a motivation. The force produced effects in the form of deformations, muscle development, behavior change, or a changed environment.

The review of the strength literature revealed or suggested several general characteristics of strength useful for defining culture strength. First, strength is multidimensional and not a general, unitary concept (Raden, 1985). This suggested that to measure strength, we must identify the dimensions making up strength, measure those dimensions, and integrate those measurements back into a conclusion about strength. Strength's multidimensionality means we shouldn't attempt to measure culture strength using a unidimensional scale, as some have done (Kotter & Heskett, 1992). Second, the

Table 2. Force and effect constitute operationalizations of strength in many disciplines.

Discipline	Force	Effect
ergonomics	human exertion	work, muscle development
electrical engineering	signal power	signal transmission
social psychology	motivation	attitude/behavior change
meteorology	storms	changed environment
strength of materials	stress	strain
culture	external forces	organizational change

review of the strength concept in various disciplines suggested force and effect are culture strength's general dimensions. Whether we're investigating the strength of an iron beam or a human's muscle group, the operationalization of strength always seems to have a force dimension and an effect dimension. Third, strength is an extensive property of state of culture. This statement, based on Weinberg's (1975) concept of extensive properties, means the pieces aren't the same as the whole—strength is different for the pieces than the whole, or not necessarily the same. This implied organizations have subcultures differing significantly from each other and from the overall culture. Fourth, strength suggests magnitude more so than dispersion. The disciplines I examined described strength of signals, muscles, and materials. These disciplines were not as concerned with dispersion or consistency across signals, muscles, or materials. Similarly, my research will focus on the magnitude of strength, yet I consider consistency for one of my culture strength measures.

Just as researchers operationalized their definitions of culture differently, so did they operationalize their definitions of culture strength differently. Kotter and Heskett (1992) said culture strength consists of known values and strong tradition. Denison (1990) saw strength as consistency in responses to survey and/or instrument items and uses the inverse of a standard deviation measure to quantify culture strength. French researchers Calori and Sarnin (1991) viewed culture strength as homogeneity of responses and intensity of cultural components such as values. This intensity measure referred to the number of values strongly held. I also used an intensity measure for culture strength and based mine on Calori and Sarnin's definition. Harrison and Carroll (1991) ran a simulation study where they operationalized culture strength as cultural stability. Harrison and Carroll found cultural stability increased in organizations experiencing rapid growth or high

turnover. Their explanation for high turnover's improvement of stability was those who fit the organization's culture the least would be more likely to leave the organization.

My definition of culture strength accounted for both the magnitude and dispersion of responses, incorporated the human element, and was rooted in my conceptual model. Just as in strength of materials there are several types of strength (e.g., tensile, compressive, torsional), in culture I also address more than one type of strength. The force-effect relationship produced shifts in values from external forces. I used the force-effect relationship in my operational definition. Examining this relationship provided one measure of culture strength. Examining the gaps between the existing culture and the desired culture through an analysis of responses to values items offered a very effective measure of culture strength. Not only is the strength concept multidimensional, there are also several types of strength.

The type of culture strength implied by the core/peripheral values model involved comparing extent of agreement to various referents. These comparisons occurred between the existing culture and the desired culture (as measured by existing values and desired values) and between the desired culture and behavior reflecting those values. I also calculated measures based on the extent of agreement responses, such as the culture gap between the existing and the desired culture, intensity, and core values. These measures are detailed in later chapters.

My operational definition of culture strength focused on the values—their extent of agreement and how that agreement compared with other perspectives. My measurement instrument embodied my operationalization of culture strength and helped me reach conclusions using the five measures of culture strength for the organization under study.

As presented earlier, I restate my operational definition of culture strength. *This operational definition is two-fold and each type of culture strength corresponds to the two basic models in my conceptualization. From the core/peripheral values model, I operationalize culture strength as the extent of agreement on values held by members of work groups and their organizations. From the stress-strain diagram, I operationalize culture strength as the ability of the work group or organization to withstand external forces.*

Chapter 4. Methodology Development

I now develop the methodology for measuring culture strength. A discussion of the five culture strength measures, the criterion variables used in this research, and the hypothesized relationships between these culture strength measures and criterion variables sets up the methodology development. This chapter describes the five culture strength measures for their derivation from the survey data, how they were analyzed, and how I believe they indicated the strength of culture.

Two of my measures—intensity and core values—were aggregated measures and were calculated for work groups and the organization overall. The other three of my measures—cultural behavior, culture gap, and forces—were calculated for each respondent. These latter three measures were used in a canonical correlation with the criterion variables. The first two aren't typically used in the canonical correlation because of their aggregate nature—I ran several canonical correlations using core values merely to investigate the effect of their inclusion.

4.1 How Others Have Measured Culture Strength

Several researchers have measured culture strength. As a multidimensional concept, culture strength is often measured by measuring dimensions of culture strength. The

culture strength dimensions addressed in the literature include intensity, homogeneity, consistency, and breadth. I discuss how these researchers have operationalized their culture strength measures. I discuss the calculation of my culture strength measures later in this chapter.

I operationalized the various culture strength measures of others using their descriptions. These operationalizations take the form of statistical equations and are shown in Figure 6. In all cases, these authors did not present formulae for their measures. I've presented mathematical formulae for their definitions of these culture strength measures. My attempt to capture their definitions using mathematical formulae may therefore not be the only formulation possible. However, I tried to retain precisely what the authors conveyed in their articles.

Calori and Sarnin (1991) studied homogeneity of responses and defined homogeneity as the inverse of the average of the standard deviations on the entire data set (values items) from an organization. Denison (1984) compared variance of responses to several culture scales across groups within an organization. If Denison found low variance, he concluded the culture had high consistency. Conversely, if Denison found high variance, he concluded the culture had low consistency. Calori and Sarnin conducted their study on a sample of five organizations. They stressed the contingency characteristics of their sample throughout their research. (They studied French organizations in a single business in mature industries pursuing a differentiation strategy.) They added the relationships between culture and performance should be studied in more depth before proposing a hypothesis linking the two. Calori and Sarnin focused on financial performance variables (measures quite distant from individual and work group behavior). Calori and Sarnin found no support for Denison's (1984) finding that high consistency of responses is

a) $I = \left\{ \left(\frac{1}{10} \sum_{i=1}^{10} \overline{v}_i \right) \Big/ \left(\frac{1}{60} \sum_{i=1}^{60} \overline{v}_i \right) \right\}$

b) $I = \left\{ \frac{1}{n} \sum_{i=1}^{n} w_i \overline{v}_i^* \right\}$

c) $I = \left\{ \left(\frac{1}{60} \sum_{i=1}^{60} \overline{v}_i \right) \Big/ \left(\frac{1}{53} \sum_{i=1}^{53} \overline{v}_i \right) \right\}$

d) $H = \left\{ \sum_{j=1}^{n} \sum_{i=1}^{60} s_{ij} \right\}^{-1}$

e) $C = \left\{ \left(\frac{1}{l-1} \right) \sum_{k=1}^{l} (\overline{x}_k - \overline{\overline{x}})^2 \right\}$

f) $B = \left\{ \left(\frac{1}{nC} \right) \sum_{i=1}^{n} C_i \right\}$

g) $CV_i = \left\{ 100 \left(\frac{s_{v_i}}{\overline{v}_i} \right) \right\}$

h) $MCV_i = \left\{ 100 \left(\frac{s_{v_i} + 3}{\overline{v}_i} \right) \right\}$

i) Core Value $= \left\{ \left(\frac{1}{C} \right) \sum_{i=1}^{C} \overline{v}_i \Big/ \left(\frac{1}{53} \right) \sum_{i=1}^{53} \overline{v}_i \right\}$

j) Culture Gap $= \left\{ \left(\frac{1}{53} \right) \sum_{i=1}^{53} |v_{ei} - v_{di}| \right\}$

Defining terms in the equations:

Eq. a: I = intensity, i = values index,
$\overline{v}_i$ = mean of ith value

Eq. b: n = number of central values,
w_i = weight for i^{th} value,
$\overline{v}_i^*$ = mean for the ith central value

Eq. c: no new terms

Eq. d: j = respondent index, s_{ij} = std. dev. for i^{th} value for j^{th} respondent

Eq. e: C = consistency, k = group index,
l = number of groups,
$\overline{x}_k$ = scale mean for group k,
$\overline{\overline{x}}$ = grand mean for scale

Eq. f: B = breadth, C = no. central values,
C_i = no. holding i^{th} central value

Eq. g: CV = coefficient of variation,
s_{v_i} = std. dev. for i^{th} value

Eq. h: MCV = modified coefficient of variation

Eq. i: C = no. of core values

Eq. j: v_{ei} = existing value, v_{di} = desired value

Figure 6. I derived equations for culture strength measures appearing in the literature.

positively correlated with high short-term performance (as measured through return on investment (ROI) and return on sales (ROS)).

Calori and Sarnin defined intensity as the average score of the ten most characteristic values in an organization divided by the average of the score on a set of sixty values in the organization.

Calori and Sarnin didn't mention how they tested the relationships between their culture strength measures (intensity and homogeneity) and their criterion variables (relative growth, ROI, and ROS) but they concluded no significant differences. They ordered the organizational-level intensity and homogeneity measures by the selected performance criterion. Their representation of the data appeared to set up the calculation of a correlation coefficient, perhaps a nonparametric measure such as the Spearman rank order correlation coefficient. The data relating intensity and homogeneity to relative growth suggested a trend: both the intensity measure and the homogeneity measure increased with the organization's increase in growth (as defined by a ratio of net change in turnover this year to last year's turnover) relative to the rest of their industry.

Calori and Sarnin's data appeared to have high correlation between the measures of intensity and homogeneity and the measures of growth, ROI, and ROS. I calculated the Spearman rank order correlation coefficient on the data to check my hunch and their conclusion. On all six possible variable pairs, the Spearman coefficient indicated correlation between 0.8 and 1.0, corresponding to $p=0.134$ and $p=0$, respectively. I would conclude significance for the cases where the coefficient is 1.0. This perfect correlation in rank was found between both growth and intensity and between growth and homogeneity. The other four correlations were all 0.8. These results are surprising since Calori and Sarnin stated these relationships were not significant; perhaps they relied solely on parametric statistics to reach their conclusions.

Wiener (1988) also addressed the measurement of intensity and breadth. Intensity was calculated by: 1) finding the mean level of agreement with each value across all respondents and 2) averaging these means across the central values, multiplying by the values' relative importance weights. (Wiener employed a clinical approach to identify central values). The overall mean was an indication of membership agreement with the

value system. His intensity measure was essentially a weighted grand mean of all central values across all respondents.

A breadth index (Wiener, 1988) reflects the extent to which values are shared. The breadth index is a ratio of the number of central values held by employees to the maximum number of values that could be held by all employees. The central values are determined by scores higher than neutral on extent of agreement scales for those values. The number of central values is the sum of central values held by each employee across all employees. The maximum number of central values that could be held by all employees is just the total number of central values multiplied by the number of all employees. This ratio has an upper limit of one when each employee has identified with each of the central values. Wiener relies on clinical or normative determination of central values, rather than empirical determination as I did for core values.

Wiener and Vardi (1990) said commitment is "a direct outcome of the normative pressures resulting from shared values." In Chapter 6, I discuss the implications of this statement as it pertains to my research. It is important to note while Wiener discusses culture measurement, he has not operationalized these measurements in any empirical work, at least as recorded in the literature. My work operationalized these and similar measures and began building an empirical base to use in assessing these measures.

However, strength brings an additional piece to the research. Strength aids the understanding of how the organization is progressing toward its normative or desired culture. This research was oriented toward the organization's desired culture and investigating the existing culture in light of what's desired so gaps can be identified and action plans developed. Strength forces a normative perspective to culture. In this research, I operationalized culture strength for measurement, compared strength to other

organizations, and investigated the linkages of culture strength with criterion variables. The linkages of culture strength with criterion variables formed vital connections for the larger issue of studying the relationships between culture and organizational performance.

4.2 Five Culture Strength Measures

Having defined culture and culture strength, I used these definitions to inspire and develop measures of culture strength. I used modified versions of several culture strength measures I located in the literature (i.e., the measures discussed earlier in this chapter) and have incorporated several other culture strength measures as well. I considered several culture strength measures in this research to allow me to test them for their effectiveness by correlating them with the criterion variables. I used the results of the correlation between the culture strength measures and the criterion variables to draw conclusions on the effectiveness of the culture strength measures used in this research. Specifically, I used a canonical correlation to maximize the correlational and predictive capability for three of my measures and I used a rank order correlation (on work group data) for all measures but focusing on the two measures not used in the canonical correlation.

4.2.1 Intensity

Culture strength can be measured by obtaining an intensity measure based on a ratio of mean extent of agreement for the most highly rated values to the mean extent of agreement for a specified set of values. Calori and Sarnin (1991) defined a culture's intensity as the "average score of the ten most characteristic values in the company divided by the average score of the sixty values in the company" (p. 61) (Eq. a in Figure 6). Wiener (1988) defined intensity similarly and added a weight for each value (Eq. b). I

defined an intensity measure for this research as the mean extent of agreement for the seven[9] (or other number as the data suggest) highest rated values divided by the grand mean extent of agreement for all 53 values tested (Eq. c). According to the literature, a high intensity measure should indicate high culture strength. My first field study suggested a high intensity *numerator* indicated high culture strength whereas a high intensity *measure* tended to be related with low culture strength.

4.2.2 Core values

I defined core values using standard deviation relative to mean extent of agreement. I originally planned to follow what others have done and use the standard deviation alone to define core values (cf. Calori & Sarnin, 1991; Denison, 1984) (Eqs. d, e). A measure of consistency based on ratios of central values held to all central values (Wiener, 1988; Eq. f) requires a discrete determination between values held and values not held. Wiener applied the rule of values with mean responses above neutral are considered held in agreement. My measures of intensity and core values considered the extent each value was held and I avoided discrete categorizations of values as either held or not held. However, interpretation is difficult when a low standard deviation exists around a neutral mean. Low standard deviation around a neutral mean does not intuitively suggest a core value; rather, low standard deviation around an extreme mean (either high or low) would suggest a core value. The pre-test and subsequent measurement showed few, if any, values with means below 3.5 (on a scale of 1 to 6). Therefore, I didn't consider the case

[9] I chose seven values based on my examination of breaks in the data by work group for MSL. In cases where values near the cut-off for the top seven values had the same mean, I chose those values having the lowest standard deviation. In several cases, I still had ties. However, the numerical result was the same. I merely interpreted the measure using the top seven values plus those values tied with the seventh value.

where a low standard deviation existed around a low mean. (Most of the values are positive and respondents typically used ratings between 3 and 6.)

By my definition, core values only exist in reference to the overall organization. While work groups hold some of these core values, a similar sorting of work group values does not result in core values. I derived core values from the survey by sorting the values data for the entire organization by a modified coefficient of variation. I originally planned to sort the data by standard deviation on the values data, but I reasoned the standard deviation would not discriminate where respondents agreed. For example, I could have a 0.1 standard deviation be the lowest in the set of 53 values yet correspond to a mean of 3.5, which is essentially a neutral response. The coefficient of variation (CV) is a ratio of standard deviation to the mean (Eq. g in Figure 6). However, a preliminary examination of the data from the pre-test showed the CV statistic allowed values with a high mean to drop out of consideration as core values because of the standard deviation. For example, consider a sample of ten people. A value where ten people rated as agree (5) would have a CV of 0 because of the standard deviation being 0. Another value where nine people rated the value as strongly agree (6) and one rated it agree (5) would have a CV=0.316, even though the data would suggest greater agreement in the latter case upon inspection.

To address this problem, I added a correction factor to the equation for calculating the CV[10]. Given my rating scale ranges from 1 to 6, the maximum standard deviation I would expect is 3. By adding 3 to the standard deviation, I changed the nature of the ratio constituting the CV statistic and removed the power of zero or near-zero standard deviation to create a very low CV. I defined this statistic using correction factors of 1, 2, and 3 on the pre-test data. I found little difference from the standard coefficient of

[10]The modification was formulated by Betty Koball upon realizing the coefficient of variation wouldn't discriminate among the core values as desired.

variation using a correction factor of 1. Two values formerly 12th and 13th in the list of values ranked in descending order by CV and having means of 5.6 were 2nd and 3rd using the correction value of 3. This suggested the correction factor better fit my need to identify core values where people have both high agreement on the item and high agreement with each other.

I therefore made the core value determination using the modified CV statistic using a correction factor of 3 (Eq. h) for each value. I sorted the values from low to high based on the modified CV. I defined a threshold above which all values were core values. Since this work is exploratory, the setting of an *a priori* threshold (e.g., above which all are core values) was ungrounded. I determined this threshold empirically for each organization.

I then calculated a mean for the core values derived from this sort (Eq. i). I calculated this mean for each work group. When a work group had a high core value measure relative to other work groups within the same organization, I concluded that work group has high culture strength. In the results section I discuss an interesting finding obtained when viewing the intensity and core values measures together for work groups.

4.2.3 Behavioral measures

I used the behavioral data to derive two different culture strength measures. The desired behavior measure is an aggregate measure whereas the cultural behavior measure can be calculated for each respondent and used in a canonical correlation. While the other measures typically elicit responses concerning the respondent, the cultural behavior measure elicits responses about how the behavior of others in the respondent's work group reflects the desired values of the organization.

4.2.3.1 Cultural behavior

A measure of cultural behavior was derived from the data respondents supplied on the percentage of people whose behavior reflects each value. Being percentages, these data ranged from 1-100%, but were mostly in the 60-100% range. As opposed to the intensity and core values measures being defined using data on existing values, the cultural behavior measure was defined using data on the desired values.

Cultural behavior is the mean of all 53 behavioral responses. This assumed the 53 values were positive and desired in the organization or work group. This measure did not discriminate with respect to any of the values since all values are included. I used the cultural behavior measure in the canonical correlation along with the culture gap measure (and its factors) and the effects scale.

For another angle on the core values and for validation purposes, if the core values measures and the behavioral measure were highly correlated, I could conclude these are two different ways of collecting the same data. If these two measures have a low correlation, this could be evidence of discriminant validity. When I included the core values measures in the canonical correlation for the Shenandoah data, the core values measures and cultural behavior had a 0.5915 correlation. This correlation suggested core values and cultural behavior measure a similar construct yet shows some evidence of discriminability between the two measures.

4.2.3.2 Desired behavior

The desired behavior measure is an aggregate measure derived from the survey responses and the desired values. I sorted the desired values data using the modified coefficient of variation (MCV). I then identified a cut-off point and selected the values above the cut-off point. I took the behavioral scores corresponding to these top desired

values and computed a mean score for each work group. I used the desired behavior measure by work group along with intensity and core values measures to correlate these results with the criterion variables as calculated by work group.

The desired behavior measure gives an indication of the respondents' perception of how the behavior of others in their work group reflected those values deemed most characteristic in the desired culture. I sorted the values data for the desired culture in ascending order using the modified coefficient of variation as described under the core values section. I took the top six values based on this sort and calculated the mean behavioral score for those values. The higher this behavioral score was, the stronger the culture. A high behavioral score meant people believed others in their work group reflected the desired values of the organization. This hinted of the next measure, the culture gap between the existing values and desired values.

4.2.4 Culture gap

I defined the culture gap for each value as the absolute value of the difference between the responses for the desired values and the responses for the existing values: $|v_d - v_e|$. I used the absolute value because I am more interested in describing discrepancies between desired and existing values than the direction of those discrepancies[11]. Raw scores would give directional data, but opposite differences of equal magnitude would cancel each other out and suggest no culture gap.

Culture gap could be defined between many different pairs of culture gap measurements. I chose to define culture gap as the difference between the existing and the desired values. Alternatively, culture gap could refer to the difference between the

[11] I compared the means of the existing values to the means of the desired values and all but one or two of the 53 values had a higher mean for the desired value.

existing values and those espoused by top management as the desired values. or culture gap could refer to the difference between the existing values and the values deemed important in the marketplace or industry.

I defined a culture gap score for each respondent. For each respondent, I generated 53 difference scores—one for each value. I then found the mean difference score for each respondent by summing all difference scores and dividing by the number of values for which I had a response. I then used these mean difference scores by respondent in the canonical correlation. Organizations and work groups with higher culture strength should have smaller gaps between responses for existing and desired values than those with lower culture strength. A low culture gap measure indicates high culture strength because the culture is presumably closer to its desired state.

4.2.5 Force-effect relationship

I used the effects scale (10 items) to derive the force-effect relationship from the survey. Respondents rated these items from 1 to 5 based on the amount of change people would expect the force (called an "event" in the survey) to exert on the work group. Because I developed this scale and this was the first time I used it, I was especially interested in its internal consistency and whether the scale was unidimensional.

I calculated an effects scale score for each respondent. My conceptualization suggested organizations and work groups with higher culture strength would be able to withstand external forces or change very little when external forces act on them. Therefore, work groups with high scores on the effects scale would be considered to have high culture strength. I used these scores as the third set of predictors in the canonical correlation (the other two being cultural behavior and the culture gap measure).

4.3 Criterion Variables

I performed a canonical correlation and other analyses to find which culture strength measures best predicted a set of three different criterion measures. The three criterion measures were selected based on their hypothesized relationships with culture strength and their use in other research on culture and organizational outcomes (cf. Odom, Boxx, & Dunn, 1990; O'Reilly et al., 1991). Many different criterion measures could be used in this research and I selected criterion measures to allow comparison with findings presented in the literature. Criterion measures could be chosen to reflect bottom-line performance in the market place (e.g., return on investment, sales growth, return on sales). The criterion measures used in this research were employee commitment, job satisfaction, and group cohesion. I note how I modified each of these scales to improve their wording and their ability to be understood so as to reduce noise in the items and therefore reduce noise in the responses.

4.3.1 Employee commitment

I used O'Reilly and Chatman's (1986) 12-item scale. Their scale has two factors: normative commitment and instrumental commitment. Normative commitment was defined by eight items representing "commitment based on an acceptance of an organization's values" (p. 498). Instrumental commitment was defined by four items representing responses to specific rewards. I modified these items to focus on work groups instead of "this organization." I also changed the word "attached to" an organization to "associated with" to represent language my sample would understand.

4.3.2 Job satisfaction

I use the single-item Faces Scale (Dunham & Herman, 1975; Kunin, 1955) to measure job satisfaction. I use the characterized face series instead of the circular face series because the characterized face series produced lower standard deviations when raters placed the faces along a 100-point scale (Dunham & Herman, 1975; Kunin, 1955). This lower standard deviation for the characterized face series indicated a higher level of agreement concerning the particular faces. The decision to use a characterized face series led to a second decision: whether to use the male faces or the female faces. (Kunin's (1955) characterized face series is male and Dunham and Herman's (1975) characterized face series is female.) Dunham and Herman (1975) found either version could be used to measure job satisfaction of both male and female employees. I've selected the female face series because this series was developed more recently than the male series. Brief and Roberson (1989) found the Faces Scale balanced in capturing positive and negative affect and cognitions when compared to other similar measures such as the Job Descriptive Index and the Minnesota Satisfaction Questionnaire.

4.3.3 Group cohesion

I used the group cohesion scale developed by Wheeless et al. (1982). This scale taps solidarity, togetherness, and closeness of a group. I modified items on this scale to focus on "my work group" instead of on "this group." This personalized the items to the respondent and placed emphasis on work groups as I've defined them for this research. I also edited several items because of collective universals such as "completely," "very," and "really." These collective universals tend to bias responses—extent of agreement scales allow the respondent to decide on the level of agreement; the researcher should not bias

this agreement level through the use of collective universals. This scale contains five reverse-coded items and I transformed those responses prior to calculating scale scores.

4.4 Hypotheses

I formulated these hypotheses to guide my research. I didn't expect this exploratory work to confirm nor disconfirm these hypotheses. Rather, I sought to set up a research procedure to test these hypotheses and to begin accumulating evidence to support (or not support) the hypotheses. While I've developed these hypotheses prior to conducting the field studies, those studies should enable me to both modify these hypotheses and to generate new ones.

I formulated hypotheses using the relationships between culture strength measures and criterion measures. Before listing my hypotheses, I state several assumptions based on the conceptualization. First, work groups within a given organization share a set of core values. Second, core values have greater breadth and depth in strong cultures than in weak cultures.

Here are my hypotheses regarding relationships between culture strength and the criterion measures.

H1: Work groups with high culture strength have higher normative commitment than work groups with low culture strength.

Strong culture organizations are characterized by members who have a strong identification[12] with the organization (O'Reilly and Chatman, 1986). Holding values

[12]O'Reilly and Chatman (1986) treated identification as a stage of commitment. They defined commitment as a individual's psychological bond to the organization including belief in the organization's values. Their three stages of commitment are compliance, identification, and internalization.

closely and being aligned with the desired culture suggest normative commitment and therefore strong culture. I've formulated hypotheses relating each of the five culture strength measures with normative commitment.

H1a: Work groups with higher intensity have higher normative commitment than work groups with lower intensity.

H1b: Work groups with higher core values measures have higher normative commitment than work groups with lower core values measures.

H1c: Work groups with higher desired behavior scores have higher normative commitment than work groups with lower desired behavior scores.

H1d: Work groups with smaller gaps between existing values and desired values have higher normative commitment than work groups with larger gaps between the existing values and the desired values.

H1e: Work groups with higher effects scores have higher normative commitment than work groups with lower effects scores.

H2: Work groups with high culture strength have lower instrumental commitment than work groups with low culture strength.

Higher culture strength suggests people are more intrinsically motivated and therefore they rely less on economic exchanges as a basis for commitment. I've formulated hypotheses relating each of the five culture strength measures with instrumental commitment.

H2a: Work groups with higher intensity have lower instrumental commitment than work groups with lower intensity.

H2b: Work groups with higher core values measures have lower instrumental commitment than work groups with lower core values measures.

H2c: Work groups with higher desired behavior scores have lower instrumental commitment than work groups with lower desired behavior scores.

H2d: Work groups with smaller gaps between existing values and desired values have lower instrumental commitment than work groups with larger gaps between the existing values and the desired values.

H2e: Work groups with higher effects scores have lower instrumental commitment than work groups with lower effects scores.

H3: Work groups with high culture strength have higher job satisfaction than work groups with low culture strength.

Higher culture strength suggests a set of core values influence the behavior of individuals in work groups. As part of a strong culture, the core values provide expectations for behavior. Individuals who either are selected by or select themselves into the organization should have a clear idea of the expectations set by the culture. As a result, I expect work groups having high culture strength to have higher job satisfaction scores than work groups with low culture strength. I've formulated hypotheses relating each of the five culture strength measures with job satisfaction.

H3a: Work groups with higher intensity have higher job satisfaction than work groups with lower intensity.

H3b: Work groups with higher core values measures have higher job satisfaction than work groups with lower core values measures.

H3c: Work groups with higher desired behavior scores have higher job satisfaction than work groups with lower desired behavior scores.

H3d: Work groups with smaller gaps between existing values and desired values have higher job satisfaction than work groups with larger gaps between the existing values and the desired values.

H3e: Work groups with higher effects scores have higher job satisfaction than work groups with lower effects scores.

H4: Work groups with high culture strength have higher group cohesion than work groups with low culture strength.

Group cohesion is related to commitment yet different. Group cohesion may be based on common values held in the work group. High group cohesion suggests common ground. This common ground can be shared experiences, being raised in similar regions of the country, where degrees have been earned, same profession, work methods and approaches, and organizational values. I've formulated hypotheses relating each of the five culture strength measures with group cohesion.

H4a: Work groups with higher intensity have higher group cohesion than work groups with lower intensity.

H4b: Work groups with higher core values measures have higher group cohesion than work groups with lower core values measures.

H4c: Work groups with higher desired behavior scores have higher group cohesion than work groups with lower desired behavior scores.

H4d: Work groups with smaller gaps between existing values and desired values have higher group cohesion than work groups with larger gaps between the existing values and the desired values.

H4e: Work groups with higher effects scores have higher group cohesion than work groups with lower effects scores.

4.5 Summary

This work is exploratory. My exploration of these hypotheses should lead to more specific hypotheses and to new hypotheses to be tested and not to hasty conclusions about the organization being studied or about the linkages between culture strength measures and criterion variables. Future research should improve the culture strength measures based on the results of this research. This research is evolutionary and feeds further research, although my results should prove useful for theory, methodology, and practice.

4.6 Major Steps in Methodology

Reading the field study chapters on MSL (Chapter 6) and Shenandoah (Chapter 7) provides the clearest explanation of my methodology and how I implemented it. However, I offer a brief generic description of the major steps in my methodology.

4.6.1 Construct values scale.

I used the Organizational Culture Profile (OCP) (O'Reilly, Chatman, & Caldwell, 1991) to measure extent of agreement with 53 of its 54 values. (The pre-test showed confusion on the "autonomy" value and rather than tamper with the content of the scale I opted to drop the item.) The values scale contained the 53 values and I asked respondents to rate their extent of agreement with each value for both the existing culture of their work group and for the desired culture of their work group. I asked the respondents to estimate the percentage of people in his or her work group whose behavior reflects those values.

4.6.2 Formulate hypotheses between culture strength and criterion variables.

As stated earlier, I hypothesized relationships between my measures of culture strength and the three criterion variables. Those hypotheses were presented earlier in this chapter.

4.6.3 Select criterion variables.

I selected variables I believed culture strength would predict. These criterion variables were: employee commitment (both normative commitment and instrumental commitment), job satisfaction, and group cohesion.

4.6.4 Decide on scales for measuring criterion variables.

I used O'Reilly and Chatman's (1986) 12-item commitment scale, the female faces scale developed by Dunham and Herman (1982) to measure job satisfaction, and the Wheeless et al. (1982) group cohesion scale.

4.6.5 Select demographic items.

I collected data on the respondent's work group. This data point was crucial to conducting my research at the work group level of analysis. Whereas other demographic data would be interesting (e.g., age, gender, length of service, employee classification) and would allow the testing of additional hypotheses, the inclusion of these demographic items would decrease the response rate.

4.6.6 Integrate scales into instrument.

I built the instrument using the scales for values, behavior, effects, commitment, job satisfaction, and group cohesion. I included the demographic item for work group. I wrote instructions around the different types of items to guide the respondent.

4.6.7 Instrument Administration

4.6.7.1 Write cover letter.

I wrote the cover letter to accompany the instrument when distributed to the sample. I emphasized the research purpose of the instrument.

4.6.7.2 Pre-test the instrument.

The pre-test group was selected as a convenience sample. I instructed the pre-test group to provide feedback to me on items and item construction, unclear or ambiguous items, problems with instructions or the task of filling out the instrument, and any other problems they found or suggestions they offered. In addition to providing feedback on the instrument, pre-test participants filled out the instrument. Because of the small size of the organizations in this study (n=69-213 employees), I used the data from pre-test participants in the actual data collection. I couldn't afford to lose their data just because they participated in the pre-test. I also shared the instrument with a measurement expert to check for problems in item construction, survey organization, and other instrument design and syntax problems. (I discuss lessons learned from the pre-test in Section 5.3.)

4.6.7.3 Revise instrument based on pre-test.

The pre-test illuminated and helped eliminate problems in item phrasing and instructions, identified items testing more than one construct ("double-barreled"), refined

the organization of the instrument, and improved on the ability of a typical organizational member to complete the instrument unassisted while providing valid responses.

4.6.7.4 Design administrative procedures.

For each application, I designed how the instrument would be distributed to respondents and how respondents would return their completed instruments. The instrument distribution and return procedures were discussed with management and decided based on that discussion. Individual responses were protected for confidentiality. Since I didn't obtain identifying information from respondents, I'm unable to track the receipt of instruments (nor did I require informed consent forms).

4.6.7.5 Distribute instruments to sample.

I distributed instruments via company mail (or other means) to participating employees complete with the cover letter.

4.6.7.6 Collect responses.

Respondents delivered their completed instruments directly to me. Once the instrument was received, I gave each instrument a unique identifier to allow for error-checking procedures. I checked each returned instrument to make sure it contains usable data. If the returned instrument was usable, it was placed in the stack of instruments to be analyzed. Respondents could not be tracked down in the case of unreturned or returned but unusable instruments.

4.6.8 Analyze responses

4.6.8.1 Calculate culture strength measures.

1. Intensity

For each work group, I took the mean for the highest values under the existing culture and divided by the mean for all values tested. The greater the intensity measure, the stronger the culture.

2. Core values

For the overall organization, I ordered the values from low to high based on the modified coefficient of variation (MCV) discussed earlier (as calculated using the responses for existing values). The items with low values of the MCV statistic suggested their status as core values. I determined the core value threshold empirically: all values scoring below a particular threshold were considered core values. For each work group, I then calculated the ratio of the mean score for core values to the mean score for all values. The higher the core values measures, the stronger the culture of the work groups.

A smaller between-group variance on the core values measures meant a stronger organizational culture. I performed a secondary analysis by work group to check the extent to which the core values were consistent across work groups. Core values held consistently throughout the organization indicated a strong culture.

3. Behavioral measures

a. Cultural behavior

The cultural behavior measure represented the mean of all behavior ratings for all 53 values. Cultural behavior was summarized by work group and then correlated with the criterion variables. Use of the cultural behavior measure did not discriminate among the 53 values—all values were treated equally.

b. Desired behavior

As discussed earlier, I sorted the responses for the desired values from low to high modified coefficient of variation. I identified a cut-off around the top six values and calculate a mean desired behavior score for those top ten values. Work groups with high mean desired behavior scores were considered to have stronger cultures.

4. Culture gap

For each work group, I calculated a difference score using the absolute value of the difference between the response for a value under the existing culture and the response for the same value under the desired culture. I calculated a mean culture gap for each value and then calculated a grand mean culture gap. A smaller this culture gap measure indicated a stronger the culture. I conducted a factor analysis on the culture gap scale to identify subscales to use in the canonical correlation.

5. Force-effect relationship

I calculated an effects scale score for each case. My conceptualization suggested organizations and work groups with higher culture strength would be able to withstand external forces or change very little when external forces act on them. Higher scores on the effects scale corresponded to smaller amounts of change. Therefore, work groups with high scores on the effects scale were considered to have high culture strength.

4.6.8.2 Calculate scale scores for employee commitment.

I calculated means and standard deviations for all items in the employee commitment scale (both normative and instrumental commitment) by work group and overall. I found the grand mean for all items for each work group for both normative and instrumental commitment. This grand mean was the normative and instrumental commitment scores for that work group.

4.6.8.3 Calculate scale scores for job satisfaction.

I calculated the mean and standard deviation for responses to the Faces Scale for each work group and overall. Since this was a single-item scale, the scale score is equal to the mean response for the item.

4.6.8.4 Calculate scale scores for group cohesion.

I calculated means and standard deviations for all items in the group cohesion scale by work group and overall. I found the grand mean for all items for each work group. This grand mean was the group cohesion score for that work group.

4.6.9 Relate culture strength measures to criterion variables

4.6.9.1 Relate intensity and core values to criterion variables using Spearman rank order correlation coefficient.

Intensity and core values measures were calculated using aggregations of work group data. As such, they shouldn't be used in the canonical correlation which requires unaggregated data, although I did use core values in the canonical correlation because I was able to calculate the core values measures at the individual level. I treated each work group as an observation and conducted a rank order correlation analysis between the work group culture measures (intensity, core values, desired behavior, effects) and the criterion variables.

4.6.9.2 Perform canonical correlation.

A canonical correlation related three of the five culture strength measures to the three criterion variables. The three variables I used in the canonical correlation were the cultural behavior measure, the culture gap measure, and the effects scale score. The canonical correlation showed how much variance the culture strength measures shared

with the criterion variables. A canonical correlation maximized the relationship between the culture strength measures and the criterion variables.

The canonical correlation can be viewed as a multivariate regression analysis where we wish to relate two sets of measures against each other. This is a more general case of regression. In regression, we have a single dependent measure and several independent measures used to predict the dependent measure. In a canonical correlation, we have several dependent measures and several independent measures and the canonical correlation analysis seeks the set of weights to maximize this relationship. In this manner, I can examine the effectiveness of several culture strength measures simultaneously.

4.6.10 Summarize conclusions for cases.

I reported the results of the data collected from each of the organizations participating in this research. These results included descriptive statistics for relevant measures: culture strength measures, employee commitment, job satisfaction, and group cohesion. I interpreted these results in light of each organization's situation and in terms of the theoretical relationships established in the conceptual model and tested in each organization.

4.6.11 Summarize validity evidence.

Using the pre-test feedback, instrument responses, and canonical correlation, I summarized the evidence for validity. I gathered evidence for face validity, content validity, and concurrent validity. Later administrations of the instrument will help in gathering evidence for predictive validity.

4.6.12 Determine the "best" culture strength measures.

Using the results of the canonical correlation and other analyses, I drew conclusions on the effectiveness of the culture strength measures in explaining variance in the criterion variables.

4.6.13 Interpret results and offer recommendations for the measurement of culture strength.

Using the results of the canonical correlation, other analyses, the evidence for validity, and the experience of interacting with the participating organizations, I offered recommendations for the researcher or manager wishing to measure culture strength in the organization. I suggested which culture strength measures were found most effective, which criterion variables tended to be associated with culture strength, and how to best obtain these data from an organization.

Chapter 5. Applying the Methodology to Organizations

5.1 Selection of Organizations

Organizations for this research were chosen as a convenience sample. My involvement and membership in several organizations has produced several candidates for this research. I conducted the first field study at Management Systems Laboratories (MSL), a research arm of the Department of Industrial and Systems Engineering at Virginia Tech. I relied on the pre-test to pilot my instrument and procedure. My second field study was conducted at the Shenandoah Life Insurance Company in Roanoke, Virginia.

I must state my relationship with the two participating organizations to surface the biases operating in this research. I have worked for MSL in several capacities. During 1984-86, I was an M.S. student and MSL funded my thesis research as well as employing me to work on grant proposals, give presentations, and participate in sponsored research. I worked for MSL from 1990-93 as a research associate and Ph.D. student. In that time period my responsibilities included managing academic publications, writing grant proposals, working with organizational and cultural research sponsored by government

and industry. I worked closely with the MSL director and several MSL managers. My tenure and level of involvement with MSL gave me an insider's perspective and certainly tainted my view of the organization.

On the other hand, I had never done any work with Shenandoah before this research. I therefore entered their organization with very few preconceived notions. I relied on incumbents to assist my interpretation of the data and did not have a framework in which to place my expected findings.

5.1.1 Management Systems Laboratories

Management Systems Laboratories (MSL) is a large research arm of Virginia Tech's Department of Industrial and Systems Engineering and is located in Blacksburg, Virginia. MSL employs 69 full-time people and 135 total employees on annual research revenues of $6 million.

5.1.2 Shenandoah Life Insurance Company

Shenandoah Life Insurance Company ("Shenandoah") is a mutual life insurance company headquartered in Roanoke, Virginia. Shenandoah has 213 full-time employees and had $179.7 million in income in 1992 with $573.9 million in managed assets. Shenandoah has policyholders and agents in 20 states and the District of Columbia.

5.2 *Selection of Respondents*[13]

The organizations participating in this research were relatively small: one had 69 full-time employees and the other had 213. Because of the small number of employees (and potential respondents), I elected to distribute instruments to the entire population of both organizations.

5.3 *Lessons Learned from the Pre-Test*

I conducted the pre-test in three rounds using volunteers from MSL and other experts I have access to. I first presented the instrument to a statistics and measurement expert to receive comments and feedback. I learned this person had trouble with some of the item wording. For example, one item on the group cohesion scale had a collective universal: "I trust the group *completely*." The "completely" biases the response along an extent of agreement scale—few people would choose "strongly agree" to an item having "completely" in it and some may react by choosing "strongly disagree" even if they trust the group but they don't feel they trust the group completely. I removed these collective universals to reduce bias in items.

I originally had two versions of the pre-test. One required the respondent to write a number from 1-6 for each of the 54 values across six columns for a total of 324 responses. I subsequently removed four of these columns and then redesigned the response format so

[13]I used the term respondent rather than subject to be consistent with Rousseau's (1990) usage. A respondent reacts to stimuli provided by the researcher, as in questionnaires or Q-sorts. According to Rousseau, treating organizational members as subjects means individual employees are the "passive objects of study" (p. 172) in studies involving participant observation and unobtrusive measures research. I additionally viewed subjects as those individuals subjected to experimental manipulation, as part of either a control or treatment group. This worked with my use of respondent (and Rousseau's, as well) because the respondent did not take part in experimental manipulation in the current research.

the respondent merely checked a box corresponding to their level of agreement (e.g., "strongly disagree," "disagree," "tend to disagree," "tend to agree," "agree," and "strongly agree"). I felt box-checking would be an easier exercise and more reliable (in terms of varying hand-writing quality) for obtaining these data.

I began distributing the instrument complete with cover letter to a representative of each group in MSL, except the group represented by the statistics expert since that group was already represented and small in size. (See Appendix E for the pre-test instrument and accompanying cover letters.) I wrote a special cover letter to the pre-test participants explaining what I'd like them to do. I also told them either in person or over the phone what I'd like them to do in terms of filling out the instrument and critiquing it. I included a blank at the beginning and at the end of the survey to record time started and finished. I distributed seven pre-tests in total. I received five in time for consideration in revising the instrument for distribution to the entire organization. I also received valuable feedback from my committee members.

In the cover letter to MSL employees, I stressed the importance of this exercise to my dissertation research and clearly differentiated this exercise from the changes occurring in MSL[14]. This met with approval of the MSL managers who added the results should not be shared with any MSL employee—manager or otherwise. The results should be reported in blind format so even groups cannot be identified. No special report would be issued; interested people would have to turn to my dissertation to get the results. In the cover letter, I stressed my goal of learning about culture strength and not about testing

[14]At the time of the survey, MSL had embarked on a strategic planning process to redefine and rethink its mission, vision, and guiding principles. This strategic planning process, unlike earlier processes, had the commitment and involvement of all MSL managers. Those managers made constant efforts to communicate with all MSL employees and involve them in the process. To facilitate this communication and involvement, several organization-wide committees were chartered. These committees addressed issues such as teamwork, marketing, and communication/feedback.

attitudes and opinions of individuals within the organization. I also stressed the coincidental timing between my graduation (and therefore the survey instrument) and MSL's culture change. I had the deputy director of MSL add a special note to the bottom of my cover letter encouraging people to respond and restating the research mission of MSL and how this research is one example. The deputy director signed this statement.

This version of the instrument had a section for gathering responses for the 54 values[15] across four forces. This had two major flaws. First, the respondents found this exercise very difficult. Even when I changed the response from a 1-6 rating to a +/-[16] mark, I still had comments regarding the difficulty. Second, this was extremely time-consuming considering the analyses I had planned for these data. This section alone required four responses each for 54 values for a total of 216 items. I would never achieve my original design target of 15 minutes for completing the survey. Pre-test participants were recording times approaching 45 minutes to an hour. I clearly had to simplify the instrument and reduce the time to less than 30 minutes (my new realistic design target). Most pre-test participants found the +/- items for forces extremely tedious, hard to answer, and time-consuming. The tradeoff between time required of the respondent and the value for my research was not justified. Third, I reexamined the value of these data to support my hypotheses. My hypotheses concerned the relationship between culture strength measures and criterion variables. I already had one measure of force and effect for culture strength. This measure was concise and had the advantage of producing data usable in a canonical correlation.

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[15]During the pre-test, I included all 54 values from the Organizational Culture Profile. As stated earlier, I dropped the autonomy item as a result of the pre-test. I therefore used 53 values in the final survey at both MSL and Shenandoah.

[16]A "+" indicated the value would change in a positive direction (i.e., greater agreement) as a result of the force scenario and a "-" indicated the value would change in a negative direction (i.e., less agreement) as a result of the force scenario.

Because a measure of effects was important to this research, I focused on the 10-item effects scale to capture these data. I originally had the scale last in the survey. I decided to put the scales critical to my research up front—in between the items on existing values and those on desired values. Pre-test participants had difficulty with the effects scale for several reasons. First, they weren't sure if the scale was to be answered for MSL or their work group. I fixed this problem by specifying the items were to be answered for the work group. Second, pre-test participants found the responses too long, too many responses (n=9), and the high end of the responses were never used. I responded by shortening the response items and reducing the number of responses from 9 to 5. I also put each of the five responses under each item and included the stem: "My work group would experience:" to prompt the appropriate response. In the pre-test, participants had to turn to the previous page to answer the final six items on the scale. Third, people didn't like these items being called forces. I responded by calling them events. Fourth, people felt these items were geared for upper management and not for people throughout the organization. I responded by rewriting the items for events all would feel, such as the unexpected request from an existing customer to do a dramatically different project than what current work group capabilities involve.

I used several existing scales in my instrument. Several pre-test participants commented on some of the item wording. I originally believed I shouldn't touch the wording of the existing scales, but the informed guidance of pre-test participants and a dissertation committee member convinced me to take action necessary to reduce noise in the responses. Based on this advice, I removed two collective universals ("completely," "very") and made items have parallel structure (especially in O'Reilly's list of values). I dropped "autonomy" from the values list because several respondents either weren't able to answer the item (and specifically told me they couldn't) or they didn't know what the

word meant. I modified items to test the respondent's work group rather than the entire organization.

The pre-test participants also suggested clearer and bolder (in terms of font) directions preceding the items. One particularly useful comment was respondents will read what is bold and skip what is italic because italics are like parentheses—they can be left out and the rest will remain intact. I heeded this advice and made critical instructions bold. Another participant suggested I add stems for existing and desired values so the respondent can quickly tell what he or she is responding to. I put the directions closer to the items to help the respondent.

A copy of the final instrument and cover letter distributed to MSL is in Appendix F.

Chapter 6. Field Study 1: Management Systems Laboratories

6.1 The Organization

Management Systems Laboratories (MSL) is a $6 million/year university research arm consisting of eight "divisions." These divisions are each headed by a senior manager and operate as separate business units. MSL has three physical locations—1900 Kraft Drive, Research Building III, and Pointe West Commons. The Director of MSL is a full-time faculty member of the Industrial and Systems Engineering Department (ISE) at Virginia Tech. A deputy director handles the day-to-day operations. MSL's 135 employees (of which 69 are full-time) represent a mix of academics and practitioners, although the academics tend to be more applied than those found in traditional tenure-track teaching faculty roles. Whereas several employees have Ph.D.'s, most MSL employees have bachelor's or master's degrees. The fields for these academic degrees vary and include ISE, education, research methodology, business, management science, sociology, psychology, computer science, public administration, and others. Many Virginia Tech students work part time at MSL and are included in the 135 employee count.

MSL's revenues come from various sources, but mostly from federal government agencies, the U.S. Department of Energy (DOE) in particular. MSL is currently in a transition phase partially driven by a change in dominant funding vehicle. Since 1986, MSL has been funded primarily by unsolicited research grants. Recently, a review conducted by the funding agencies decided research contracts were the more appropriate vehicle. Research contracts are solicited via requests-for-proposal and many qualified organizations typically compete for these contracts.

MSL's transition is also a function of the Director's changing role in the organization. From its chartering in 1981, MSL has been guided by the Director (who is also the founder) in both strategic and day-to-day matters. In January 1992, the Director took a nine-month research leave to begin writing a textbook. This leave necessitated the appointment of a deputy director of MSL to make decisions in the Director's absence. Shortly after the conclusion of the Director's leave, the deputy director position was made a permanent appointment. The Director has adopted a role more closely associated with a traditional teaching faculty role and has curtailed his day-to-day involvement with the organization.

6.2 Sample

I distributed the instrument and cover letter, which are found in Appendix F. These were distributed to all 69 full-time employees of MSL on February 10, 1993. Because I am an MSL employee and the researcher, I did not complete the instrument, thereby reducing the total population to 68 full-time employees.

I surveyed full-time employees at MSL. My assumption was students and full-time employees would each respond differently because they view their work experiences through different perspectives. Full-time employees rely on their association with MSL for their livelihood. Students may rely on MSL to a lesser extent for their livelihood, but typically, they have other sources of income (e.g., other jobs, savings, loans, parents, scholarships), and their goal is to leave MSL/Virginia Tech and get a job elsewhere upon graduation. It would be interesting to test this full/part-time difference empirically, but my hypotheses have nothing to do with full/part-time differences and this is outside the scope of my research. These differences would only tend to add noise to the data thereby conflicting with my research objective of identifying effective measures of culture strength.

The small population (n=68) and MSL's historical negative reaction to demographic items precluded the use of an employee classification item on the survey. I opted to maximum the response rate by asking for minimal demographics.

The MSL field study involved a small sample size (43 returned surveys). Although I couldn't use these data to draw inferences with high levels of confidence, the data supplied an application for statistical tools to organize the data and refine my analysis methods so I could make better use of the data from the second organization (n=213). Many of these results made sense when interpreted in terms of the MSL organization and its work groups and therefore added face validity to my procedure. ***I caution the reader to treat the interpretation and inferences drawn from the MSL field study as tentative.*** Although I've tried to limit my interpretation and inferences, I've documented the interpretations and inferences I made. The reader (and I) should be careful not to allow this first field study to constrain the ability of the second field study to offer new insights at higher levels of confidence (mostly due to the larger sample size in the second field study).

6.3 Instrument Administration and Collection

I conducted the first field study at MSL. I pre-tested the instrument twice before distributing the instrument to the entire organization.

I distributed the survey instrument to all full-time MSL employees by placing the instrument (with attached cover letter) in each employee's in-box. On February 15, I posted a reminder (Appendix G) to MSL employees to return their completed instruments. This reminder was humorous and received many positive comments. The reminder took the form of a "to do" list and its first-listed item was the return of my survey and was highlighted with larger type, bold lettering, and circled. The other listed items referred to MSL cultural artifacts such as pouring coffee in the plants[17] and watching the deer in the field adjoining the MSL property. I would only use such a reminder with an organization I felt very comfortable in doing so. I believe this reminder was useful in helping increase my response rate, but I have no hard data to support this belief. I posted these reminders in standard places where employees were likely to see them during the course of the work day—in the elevator, on the walls near the restrooms (on both floors), and on the door leading upstairs (for those who don't use the elevator). I also posted reminders at Research Building III and at Pointe West Commons. I set a return date of February 16 for the instruments. I extended the return date to February 18 and received 43 completed and usable instruments (for a response rate of 63%). The numbers of responses received by work group are shown in Table 3. Half the work groups were represented by four or fewer responses. I decided to cut off the data collection so I could perform final analysis of the data. I used MSL's internal mail system to both distribute the instruments and for their return by respondents. Some respondents opted to return the instrument directly to

[17]I've never seen anyone do this at MSL. Its inclusion was merely for humor and to attract attention.

my MSL in-box. Although the instruments were sent out as a stapled set of paper including cover letter and instrument, approximately 50% of the completed instruments were returned using interdepartmental envelopes, presumably to protect the confidentiality of responses and respondents.

Once I received a completed instrument, I assigned a sequential identifier to the instrument and wrote that number in the upper right corner of the cover letter (or the first page of the instrument if the cover letter was detached). This sequential identifier was used to assist in data entry and data checking. If I found an error in a record, I then was able to return to the original data and ensure accuracy. I held the surveys in a secure place until I was confident I would no longer have to refer to them. I then destroyed the surveys and disposed of them away from MSL. This fulfilled my agreement made with MSL employees via the cover letter accompanying the survey instrument.

In my research I hope to find better ways of measuring culture strength in organizations and work groups. Along the way, I may find out interesting things about

Table 3. The MSL data set was comprised of surveys from all eight work groups.

Work Group	# Received
A	7
B	3
C	8
D	3
E	4
F	7
G	4
H	7
Total	43

the organizations involved in my study, but these are ancillary to my primary research objective. Therefore, I've designed my research to best support the development of a procedure for measuring culture strength for any organization.

6.4 Data Analysis and Results

6.4.1 Internal consistency

I checked each of the scales used for their reliability using a test of internal consistency. I used Cronbach's alpha to see if people responded to the scales in a consistent manner. I noticed improvements in reliability when certain items were deleted. If scales were reliable (i.e., were internally consistent), then I could proceed with my analyses.

I performed these analyses using the full sample of 43 returned instruments from the first field study (MSL). Because of the small sample size, I retained all items to allow further testing of reliability rather than discard them based on this early analysis. I checked reliability for the existing values items, the desired values items, the cultural behavior scale, the effects scale, the commitment scales (both normative and instrumental commitment), and the group cohesion scale.

All scales had acceptable internal consistency in their tested form (i.e., $r \geq 0.70$), except for instrumental commitment (see Table 4). The existing values scale (53 items) had a Cronbach's alpha of 0.9580. The desired values scale (53 items) had a Cronbach's alpha of 0.9311. The effects scale (10 items) had a Cronbach's alpha of 0.7099. The cultural behavior scale had a Cronbach's alpha of 0.9559. The normative commitment scale (8

items) had a Cronbach's alpha of 0.8670. The instrumental commitment scale (4 items) had a Cronbach's alpha of 0.6631[18]. The group cohesion scale (18 items) had a Cronbach's alpha of 0.9514. I concluded the scales used in my research had acceptable levels of internal consistency (meaning people responded to the scales in a consistent manner) so I could proceed with my analyses, although I noted the relatively low reliability for the instrumental commitment scale.

Table 4. All scales used in the MSL study had acceptable reliability, although the reliability of the instrumental commitment scale was relatively lower.

Scale	α	Mean	Std. Dev.
Existing values	0.9580	4.2551	0.7209
Desired values	0.9311	4.9175	0.4125
Effects	0.7099	3.2000	0.5357
Cultural behavior	0.9559	66.89%	14.12
NCOM	0.8670	3.8454	0.9388
ICOM	0.6631	2.6179	0.8792
Group cohesion	0.9514	4.1104	0.8887

6.4.2 Preliminary analyses

I ran analyses on the first ten surveys received. This allowed me to test the analysis procedures and programs and get these procedures running smoothly by the end of data collection. I started by taking the data for existing values[19] and trying to discern trends by inspection. I was looking to see if the ranking by means or the ranking by standard deviations would supply useful information for my intensity and core values measures. After inspecting the response patterns visually for the 10 returned surveys, I constructed three plots. Two of the three plots involved a coefficient of variation, which is the

[18]I used the Spearman-Brown prophecy formula to estimate the reliability of the instrumental commitment scale if it had 10 item (instead of four) of similar quality. The Spearman-Brown prophecy formula produced an estimate of 0.83 for the theoretical 10-item scale.

[19]Throughout this document, I refer to values under the existing culture as "existing values" and I refer to values under the desired culture as "desired values."

standard deviation divided by the mean. However, these plots were not as illuminating to the process as were the tables of data used to generate the plots. These tables showed several values with a standard deviation of zero automatically jumping to the top of the list as ranked by the coefficient of variation, even though the mean wasn't necessarily high. This observation led to the modification of the coefficient of variation as described in the methodology chapter.

Data from the completed instruments were entered into a personal computer-based data base package. I designed input screens with spaces between fields corresponding to where the page of the instrument must be turned to continue entering data. This built in a data checking mechanism—if the spaces between fields and turning the page did not correspond, this was a flag that an error had occurred and the person entering data could capture the error early. I uploaded the data from the data base to the MSL and Virginia Tech mainframes to facilitate analysis using SAS (a statistical analysis software package). I used SAS (version 6.06) to perform many of the statistical procedures such as canonical correlation, factor analysis, Cronbach's alpha, and descriptive statistics. I downloaded the descriptive statistics to a spreadsheet package on the personal computer (Microsoft Excel 4.0) because of the difficulty of instructing SAS to sort and order output. The spreadsheet allowed for easy, real-time sorting capabilities required in my calculation of culture strength measures such as intensity and core values. The spreadsheet also allowed for quick plotting of results so I could get a feel for the data without wrestling with SAS procedures. I found SAS more suited to analyzing data where many cases (records) need to be reduced to an aggregate data set, when exact analysis procedures are known in advance, and where few additional procedures are anticipated. I found the spreadsheet approach suitable for my research, because I was using the output of SAS as input for additional analyses. These additional analyses were no longer reported against

observations (or respondents), but against values items and other items in my instrument. Because of the exploratory nature of my research, I found it necessary to perform many different types of analyses to see what was happening to the data as I manipulated them. The spreadsheet allowed me to view these manipulations in real-time.

6.4.3 Analyzing existing values and culture gap using canonical correlation

I followed several steps throughout my analysis of the values items. I performed these steps for existing values, desired values, and a difference score calculated between the two (culture gap).

1. Compute Cronbach's alpha using the 53 items. Note items with negative item-to-total correlations.
2. Run a factor analysis using all 53 items. Use a varimax rotation for clarity.
3. Identify factors having an eigenvalue of 2.0 or higher. Select items with loadings of 0.55 or higher for inclusion in the factors.
4. Name the factors.
5. Define the factors in the SAS program so they can be calculated for each respondent.
6. Run a canonical correlation using the factors from the values items (culture gap), rather than the overall culture gap score. (Culture gap was such a strong factor in preliminary factor analyses that I decided to identify what subscores might exist among the 53 items.)
7. Look at the canonical variables for those with eigenvalues of 1.0 or higher and $p \leq 0.10$.
8. Translate the output of the canonical correlation.
    a. mechanical translation: Use the standardized canonical coefficients to write the equation for the canonical variable using the predictor variables.
    b. interpretive translation: Look at the correlation of the culture strength measures with the canonical variable to interpret the canonical correlation. The

interpretation of the variates is based on those variables having a high correlation with the variates, rather than those that are components of the variables.

I demonstrate these steps in action as I discuss my analysis of the MSL data.

The methodology described my procedure for calculating culture gap scores[20]. The culture gap I consider here is the mean absolute value of the difference scores generated between existing and desired values. I obtained 53 such difference scores for each respondent. I then found the overall mean (a single number) for each respondent. I then aggregated these respondents into work groups and into the overall organization so I could describe the nature of culture gaps. I noted which values had the largest and smallest gaps, because this provided important information in my interpretation of the data. The largest gaps indicated values where interventions may be designed if the organization or work group wishes to achieve its desired culture. The smallest gaps indicated values where there was alignment between existing and desired values. This alignment could exist because the organization or work group achieved its desired culture or because respondents perceived no need to change from the existing culture.

I used a canonical correlation analysis to study the relationships between the culture strength measures (predictor variables) and the outcomes measures (criterion variables). The canonical correlation is essentially a multivariate regression analysis—multivariate in the sense there is more than one dependent variable (predictor variable). The canonical correlation finds several sets of weights maximizing the relationship between the predictor variables and the criterion variables. These weights helped in judging the effectiveness of various culture strength measures to predict the criterion variables.

[20]Throughout the data analysis discussion, I referred to values as the content of culture. I referred to the numbers taken on by variables of interest in my analyses as numerical values to distinguish them from cultural values. I also referred to "scores" instead of "values" when discussing the output of numerical computations.

I ran a canonical correlation analysis for the first 10 responses using culture gap and the effects scale score as my predictor variables and commitment, job satisfaction, and group cohesion as my criterion variables. The largest bivariate correlation (0.8576) was between culture gap and group cohesion. The first canonical correlation was 0.8731, not much of an improvement over the culture gap-group cohesion correlation. However, at such a small sample size I wouldn't necessarily expect great improvement using the canonical correlation. The standardized canonical coefficients didn't tell me anything more than the bivariate correlations.

The behavior measure and culture gap had moderate negative correlations with each other (-0.45 to -0.67). As behavior approached the desired values (equivalent to an increase in the behavior measure because many desired values were ranked 5-6), the culture gap decreased.

I did a second canonical correlation analysis by adding the cultural behavior measure to the predictor variable set. The bivariate correlations showed cultural behavior highly correlated with commitment and group cohesion. The addition of cultural behavior also demonstrated the value of performing a canonical correlation—the canonical correlation was 0.9494 compared to the largest bivariate correlation of 0.8576. Now I could see the power of the canonical correlation procedure to maximize the relationships between the two sets of variables.

I decided to redo the canonical correlation breaking commitment into its normative and instrumental dimensions (as determined by O'Reilly and Chatman, 1986). I had 31 observations to run this canonical correlation. Whereas the correlations with commitment were positive, except for culture gap, now the correlations were positive with normative commitment and negative with instrumental commitment. (Again, correlations with

culture gap were opposite in sign.) This suggested normative commitment was perceived as a positive outcome whereas instrumental commitment was perceived as a negative outcome. This canonical correlation demonstrated a 0.05 improvement in correlation between the largest bivariate correlation (0.8473) and the first canonical correlation (0.8983).

The additional cases (31 vs. 10) and variables (the two commitment dimensions) resulted in a p-value change of the Wilk's λ statistic from 0.0505 to 0.0001. Wilk's λ is the statistic for obtaining the p-value for the canonical correlation. The Wilk's λ p-value of 0.0001 means these findings are significant.

Tests of significance for canonical correlation assume at least one of the sets of variables (either the predictor set or the criterion set) had a multivariate normal distribution. My sample size of 43 is greater than the 30 typically required to assume normality for a univariate normal distribution given the Central Limit Theorem. I assumed multivariate normality of the variables used in the canonical correlation because there is no compelling evidence not to make that assumption.

When I correlated the culture strength measures with the criterion variables, the culture gap measure was highly correlated with the group cohesion scale. I wanted to find out more detail on the function of the culture gap measure. For example, does the culture gap have subscores that would shed more light on the relationships with the criterion variables? Are any of these subscores correlated with job satisfaction? Knowing the 53 values would most likely cluster into several factors, I decided to conduct a factor analysis. (Preliminary factor analyses suggested using only those factors with eigenvalues greater than 2.0 and items with factor loadings of 0.55 or higher. Earlier factor analyses

using factors with eigenvalues between 1.0 and 2.0 along with factors having loadings of 0.40 to 0.55 showed little value for their ability to predict the criterion variables.)

I still aimed to improve this process, so I decided to perform a factor analysis on the 53 values represented by the culture gap measure. I hypothesized the culture gap measure had dimensions that would correlate differently with the criterion variables, similar to the way the two commitment dimensions produced opposite-signed correlations.

The interpretation of the factors resulting from the culture gap measure was a more difficult task than the interpretation of factors resulting from the existing values, for example. The existing values responses were obtained directly from ratings of the 53 values items. The desired values responses were obtained the same way. However, culture gap was derived from the difference between responses for the existing culture and the desired culture. I ran a factor analysis on the existing culture values—the factors resulting from that factor analysis suggested people responded similarly to the items making up each of the factors[21]. Since culture gap was derived from two sets of responses, the interpretation was more difficult. The items would tend to cluster into factors containing items receiving similar responses regarding the gap between the existing values and the desired values. As such, culture gap factors tended to be more heterogeneous than those factors resulting from the actual responses from either existing or desired values. However, the apparent power of the culture gap measure in explaining the variance of the criterion variables necessitated more detailed analyses to ascertain the nature of the culture gap's subscales in forming the link with outcomes (the criterion variables).

[21]This analysis of the culture gap required group data to be combined into organizational data using the individual as the unit of analysis. While I don't resolve this issue, I acknowledge the concerns of aggregating data from different levels of analysis to make statements about the organizational level.

I ran several preliminary factor analyses on the existing values and the desired values to see how many factors would result and to decide an eigenvalue cut-off for selecting factors and an item loading cut-off. I used a varimax rotation for clarity. I learned from analyses I had run for the first 10 responses received that the 53 values would produce many factors (12-15) and that most of the lesser factors wouldn't be indicated as being effective measures of culture strength. By running the factor analyses and using these factors in a canonical correlation, I was able to demonstrate how many factors were useful in explaining variance in the criterion variables. For this run, I selected the first eight factors and used item loadings of 0.55 or higher. I named these factors: 1) performance, 2) job/feedback/philosophy, 3) adaptability/people, 4) aggressiveness, 5) friends, 6) risk, 7) rules, and 8) predictability.

For the canonical correlation, I used the top three factors because factors 4-6 were relatively weak (explaining 5.26%, 4.81%, and 4.14% of the culture gap scale's variance, respectively). These three factors were: performance, job/feedback/philosophy, and adaptability/people. The first canonical correlation was 0.8797 with a $p \leq 0.0001$. The largest bivariate correlation was 0.7734 between the performance factor and group cohesion. The canonical correlation was able to maximize the relationship between the culture strength measures and the criterion variables. This analysis provided insight into the culture gap scale. The performance dimension was the only one of the three culture gap dimensions to have a standardized canonical coefficient greater than 0.40 (at 0.4273). Again, group cohesion was the only criterion variable with a standardized canonical coefficient greater than 0.40 (at 0.9774). The performance factor was interpreted in terms of the cultural behavior measure and the other two culture gap factors used in the analysis because both the cultural behavior measure and the other two culture gap factors were correlated with the canonical variate.

6.4.4 Final analysis

The final analysis (43 surveys) using the MSL data produced seven factors with eigenvalues of 2.0 or higher. I included items loading 0.55 or higher in the definition of factors. These factors differed somewhat from those determined using the set of 31 surveys (as suspected). The factors and the items loading onto those factors are shown in Table 5. I used the top three factors in the canonical correlation. These factors were: performance, reflective/philosophy, and job-related values. Together, these three factors accounted for 52.06% of the variance in the culture gap scale.

To facilitate the construction of tables, I used abbreviated phrasings for the 53 values items. The reader should refer to the full names of the values in the survey instrument

Table 5. The first three factors for the full MSL data set had these values loaded 0.55 or higher. (Percentages refer to the proportion of variance explained by each factor. Factor loadings are in parentheses.)

Factor 1	**Factor 2**	**Factor 3**
PERFRMCE	**REFLPHL**	**JOB**
39.47%	**6.88%**	**5.71%**
detail (0.82)	clear phil (0.67)	confront conflict (0.78)
organized (0.80)	reflective (0.60)	secure employ. (0.76)
precise (0.79)	praise (0.59)	enthusiasm (0.63)
results (0.69)		one culture (0.59)
social resp (0.68)		high pay (0.55)
initiative (0.66)		
quality (0.63)		
collaboration (0.59)		
innovative (0.59)		
high performance (0.58)		
team (0.57)		

located in Appendix F.

The canonical correlation from the final MSL data produced a canonical correlation of 0.8550 ($p \leq 0.0001$), compared to the largest bivariate correlation of 0.7449, again between the performance factor and group cohesion. Both the cultural behavior measure and the performance factor had standardized canonical correlation coefficients (SCC)[22] greater than 0.40 and group cohesion was the only criterion variable with an SCC greater than 0.40. However, the interpretation of the performance factor shows it subsumed[23] the cultural behavior measure and both of the other culture gap dimensions used in the analysis. The group cohesion measure subsumed the normative commitment measure. This analysis resulted in a canonical R^2=0.7310, meaning (in the first canonical variable) the culture strength measures share 73.1% of the variance with the criterion variables.

This canonical correlation showed the relative weights for the culture strength measures and suggested the cultural behavior measure and the performance dimension of the culture gap measure were the strongest predictors of the criterion variables. The other three variables contributed to the ability to predict, but to a lesser extent. The second field study did not show the effects scale playing a significant role in predicting the criterion variables.

I then built the equation for the canonical variable using the SCCs for the culture strength measures. Table 6 shows the standardized canonical coefficients. Table 7 shows the bivariate correlations between the culture strength measures and the criterion

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[22]The standardized canonical coefficients are a set of weights useful for comparing the relative effects of one or more measures within a set of measures in a canonical correlation. I use the term "weight" interchangeably with the term "standardized canonical coefficient" to make the text more concise.

[23]I used the word "subsume" because it was descriptive and it allowed my discussion to stay somewhat concise. For example, here the performance factor was correlated with the cultural behavior measure and two of the culture gap factors. I said the performance factor subsumed these other measures because we could just look at the performance factor to assess the relationships between culture strength measures and the criterion variables. I used the word "subsume" throughout my discussion.

variables. Table 8 lists descriptive statistics for each scale used in the canonical correlation. I used the *standardized* canonical coefficients so I could interpret the measures relative to each other. However, to calculate the canonical variable for each respondent, I used the *raw* canonical coefficients. I calculated the canonical variable for each respondent and aggregated by work group for comparison to measures of intensity and core values. (I report on this analysis later in this chapter.) The equation for the first canonical variable was(using the raw canonical coefficients): 0.4686(BEHAV) - 0.0591(EFFECTS) - 0.4381(PERFRMCE) - 0.3399(REFLPHL) + 0.1197(JOB) = 0.0829(NCOM) + 0.2794(ICOM) - 0.1166(JOBSATIS) + 1.1043(GROUP). (BEHAV is the cultural behavior measure derived from the mean of all 53 behavior ratings. EFFECTS is the mean score from the effects score. PERFRMCE, REFLPHL, and JOB are the top three culture gap factors. NCOM is normative commitment whereas ICOM is instrumental commitment. JOBSATIS is the faces scale for job satisfaction. Finally, GROUP is the group cohesion scale.)

I interpreted this canonical correlation as follows. As the culture gaps decrease (i.e., existing values approach desired values) for the performance factor and as the people's

Table 6. Cultural behavior and two of the culture gap factors were the best predictors of the criterion variables for MSL.

Culture Strength Measures			Criterion Variables		
Variable	**Coefficient**	**r**	**Variable**	**Coefficient**	**r**
BEHAV	0.4686	0.86	NCOM	0.0829	0.72
EFFECTS	-0.0591	-0.22	ICOM	0.2794	-0.31
PERFRMCE	-0.4381	-0.92	JOBSATIS	-0.1166	0.30
REFLPHL	-0.3399	-0.75	GROUP	1.1043	0.96
JOB	0.1197	-0.58			

Note: The statistic r denotes the correlation of the variable with the canonical variable. ($\lambda = 0.2011$, $p < 0.0001$, $R^2 = 0.7310$)

Table 7. Bivariate correlations between culture strength measures and the criterion variables provided a benchmark for the canonical correlation results.

	NCOM	ICOM	JOBSATIS	GROUP
BEHAV	0.5913	-0.3004	0.1467	0.7100
EFFECTS	-0.0396	0.0345	-0.0426	-0.1785
PERFRMCE	-0.5076	0.2122	-0.1937	-0.7449
REFLPHL	-0.4972	0.1948	-0.4086	-0.6341
JOB	-0.4814	0.3181	-0.3237	-0.5267

Table 8. Descriptive statistics provide a basis for the variables used in the canonical correlation.

Variable	Mean	Std. Dev.
BEHAV	66.8858	14.1227
EFFECTS	3.2000	0.5357
PERFRMCE	0.8417	0.8840
REFLPHL	1.3902	1.2085
JOB	1.4561	1.0397
NCOM	3.8454	0.9388
ICOM	2.6179	0.8792
JOBSATIS	6.5366	2.4093
GROUP	4.1104	0.8887

behavior increasingly reflects the surveyed values, this represents a stronger culture and this stronger culture is evidenced by the increase in the criterion variable of group cohesion.

6.4.5 Intensity and core values

Not all the culture strength measures could be analyzed using the canonical correlation procedure because they relied on aggregated data (e.g., top seven values). The canonical correlation procedure required the ability to use data attributable to each respondent, rather than to each work group. (If I had 30, 40, or hundreds of work

groups, I could conduct a canonical correlation using work group data.) The intensity measures relied on aggregated data and could not be analyzed by the canonical correlation. However, I integrated the canonical correlation results into this analysis by calculating the canonical variable for each respondent, aggregating these into a canonical variable for each work group, and then computing a Spearman rank order correlation coefficient between several culture strength measures (including the canonical variable) and the criterion variables. See the canonical variables by work group in Table 9.

Table 9. Canonical variables by work group were correlated with criterion variables.

Work Group	A	B	C	D	E	F	G	H
Canonical	1.367	1.682	1.411	1.659	0.309	1.549	1.877	-0.030

6.4.5.1 Intensity

I sorted the descriptive statistics (mean, standard deviation, minimum, and maximum) for each existing value from high to low based on the mean extent of agreement with each value. I then determined a cut-off point for the overall organization and for each work group using the mean. Using Calori and Sarnin's (1991) definition of intensity, I started with the top seven values to use in my calculation of intensity. I didn't choose the number seven arbitrarily. I wanted the number to be large enough to have at least 3-5 values suggested by Calori and Sarnin (1991) as being part of a strong culture. I wanted more than five values to allow for variation among a broader set of values than those found in the strongest cultures. I found a natural break in the data by work groups supporting my use of seven values as a cut-off. This choice of seven values is subject to change. (The intensity data are shown in Appendix H.)

The intensity measure is the average of the mean extent of agreement scores for the top seven (or other suitable number) of values under the existing culture divided by the average of the mean extent of agreement for all 53 values under the existing culture. I've

calculated intensity measures for each of MSL's work groups[24]. These intensity scores are reported in Table 10 along with values making up those scores.

To calculate intensity, I sorted the data by work groups and then by mean (high to low) and by standard deviation (low to high). Recall the definition of intensity as the mean of the top values (as determined by mean score for each value) in the organization divided by the mean response for all 53 values. I used the top seven values to calculate intensity because the data showed a break between the seventh and eighth values. Seven values is also close to the ten values suggested by Calori and Sarnin (1991) in their intensity measure.

In several cases, even the sort by mean and standard deviation didn't produce an area where a clear cut could be made. This didn't affect the numerical calculations but it did affect the interpretation. Instead of intensity representing seven values, it represented all values to the point where the tie is broken.

Calori and Sarnin (1991) suggested higher intensity is associated with stronger culture, although their study didn't report evidence for the hypothesis of intensity being associated with strong culture. My data suggested intensity was inversely related to work group criterion measures. In fact, the work groups having high intensity measures were among those work groups having lower criterion measures. The work groups having low intensity were among those having higher criterion measures. See Table 11 for the intensity and criterion data by work group.

[24]In my discussion of the field study data and results, I spoke of core values and values making up the intensity measure. Although my conceptual model referred to these values as core values and peripheral values, I hesitate calling a work group's values peripheral. To the work group, its top values were central to their way of getting work done.

Table 10. The values making up the intensity scores are illuminating when considering the culture of MSL's work groups.

	Work Group			
	A	B	C	D
Values	12 detail 1 flexibility 5 stability 27 action 9 careful 33 high performance 46 quality	5 innovative 11 analytical 34 prof. growth 46 quality 6 opportunities 7 experimentation 13 precise 18 fair 19 individual rights 20 tolerant 21 informal 24 support 30 achievement 43 enthusiasm	42 collaboration 12 detail 1 flexibility 2 adaptability 13 precise 21 informal 46 quality	19 individual rights 9 being careful 18 fair 20 tolerant 14 team-oriented 48 reputation 49 social resp.
intensity	1.2203	1.2135	1.1984	1.1899
intensity numerator	5.4898	5.5714	5.5000	5.3810

	Work Group			
	E	F	G	H
Values	12 detail 9 being careful 48 reputation 10 rule-oriented 44 long hours 32 ind. resp. 50 results	12 detail 2 adaptability 5 innovative 6 opportunities 46 quality 28 initiative 50 results	14 team-oriented 36 secure employ. 46 quality 49 social resp. 17 people 19 ind. rights 35 high pay 42 collaboration	10 rule-oriented 21 informal 13 precise 12 detail 31 demanding 33 high performance 1 flexibility
intensity	1.4268	1.2437	1.1995	1.2199
intensity numerator	4.9286	5.1224	5.6429	4.5102

Note: Some work groups have more than seven values because of ties. Only seven values were used in the calculation of intensity and numerator of intensity measures. Numbers refer to values in the survey instrument.

A rank order correlation coefficient (Spearman ρ) supported my observation at fairly high levels of confidence. (See Table 15 for Spearman ρ's between culture strength measures and criterion variables later in this chapter.)

I then examined the top seven values making up the intensity measure and, specifically, the numerator. The intensity *numerator* acted more like Calori and Sarnin's intensity measure—work groups with higher intensity numerators tended to be those I perceived having higher criterion measures than those with lower intensity numerators. A Spearman ρ showed the intensity numerator highly correlated with group cohesion (0.976) and more moderately correlated with normative commitment (0.619) and instrumental commitment (-0.667).

When analyzing the intensity data by work group for MSL, one group which I hypothesized in advance would have a low intensity score actually had a high intensity score. I expected that work group to have low intensity because of my perception of that work group as having lower criterion measures compared with other MSL work groups. I reviewed my calculation of that score and found it was correct. I then wanted to see what

Table 11. The MSL intensity measures were found negatively correlated with job satisfaction and group cohesion and positively correlated with normative commitment.

Work Group	Intensity	NCOM	ICOM	Job Satis	Cohesion
A	1.22	3.50	2.00	7.43	4.21
B	1.21	4.29	2.17	6.67	4.52
C	1.20	4.32	2.53	5.63	4.44
D	1.19	4.33	3.17	7.33	4.28
E	1.43	2.75	2.63	3.75	3.63
F	1.24	3.64	3.21	6.43	3.82
G	1.20	4.47	2.15	8.50	4.90
H	1.22	3.68	3.02	7.14	3.32

made that group's intensity score high relative to the other work groups. Since intensity is a ratio of the average of the means for the top-rated values (the top seven in my study) to the average of the means for all 53 values, several scenarios can produce a high intensity score. Intuitively, I would expect a high intensity score to reflect a high numerator and a relatively constant denominator across work groups. However, a second scenario can also produce a high intensity score—when the denominator is low.

I interpreted the assumption of Calori and Sarnin (1991), who operationalized intensity in their work, to be that the intensity denominator would either remain relatively stable from organization to organization or the denominator would act to standardize responses. The standardization of responses would correct for patterns of high or low response and put all work groups on an equal footing. Back to the MSL work group, I found the work group with high intensity (where I expected low intensity) had a low overall mean for all 53 values (denominator). I checked to see if this high intensity measure was due to a style of responding or to a form of dissatisfaction with the work group.

I investigated the properties of the intensity measure by calculating intensity two different ways—once for the existing values (the definition) and once for the desired values. If the intensity measure produced similar numerical values for both the existing values and the desired values, then I would conclude high intensity would be due to a style of responding (i.e., respond high as a group or low as a group). In general, if the intensity measure produced different numerical values for both the existing and the desired values, then I concluded high intensity would be due to a form of dissatisfaction with the work group. I found intensity was lower for the desired values, so the denominator increased indicating dissatisfaction with the values because a large amount of change was noted between existing values and desired values.

Therefore, the intensity measure is more than how the top values relate to the entire set of values. The intensity measure tapped how different response styles on the top values compared to responses on all values in general. This distinction is subtle, yet important. The intensity measure should be interpreted for each work group rather than interpreted by comparing work group to work group because it's the difference in work group response patterns from the top values to all values that is measured by intensity.

These top seven values by work group were so illuminating that I was able to identify specific work groups just by looking at the top values. MSL management requested I blind code the responses so no work group can be readily identified. Therefore, I interpreted the data for their own sake without commenting on the context of the work group. Though not reported here, I used my knowledge of the organization and its work groups to fuel many of the unplanned analyses, including the investigation of the intensity measures.

6.4.5.2 Core Values

For the entire organization, I identified the top eight values using a modified coefficient of variation (MCV) statistic (Table 12). I arrived at the top eight values (as opposed to the top seven or the top nine) by inspecting the existing values data from MSL and identifying a cut-off point based on the MCV. The cut-off point corresponded to an MCV≤86%. The values with MCV less than 86% were then identified as core values.

Then, for each work group, I found the average of the means for each of the core values. This gave me a measure of how strongly these core values are held throughout the organization's work groups. These core values measures by work group are presented in Table 13.

The two groups (E and H) having lower core values measures than the other work groups were not a surprise. Group E had the lowest job satisfaction, the lowest normative commitment, and the second lowest group cohesion scores. Group H had the lowest group cohesion and fell in the middle of the pack for the other three measures. The two groups having higher core values measures (A and C) matched my *a priori* hypotheses. The data showed group A with the second highest job satisfaction, the lowest instrumental commitment, but the second lowest normative commitment. Group C had relatively high scores for both normative commitment and group cohesion, yet had the second lowest job satisfaction score. Work groups A and C have a history of working closely with MSL's director and therefore I'd expect those work groups to reflect the core values (which are highly compatible with my perception of the director's values). Work groups E and H do not work closely with the director and their core values measures reflected this in their lower numerical value.

Table 12. I identified eight core values for MSL using the modified coefficient of variation. (Numbers in parentheses refer to the value number in the survey instrument. The full list is in Appendix I.)

Value	Mean	Std. Dev.	MCV
paying attention to detail (12)	5.3023	0.9395	74.30%
being precise (13)	4.9302	1.0327	81.80%
being informal (21)	4.8837	1.0284	82.49%
adaptability (2)	4.8140	1.0295	83.70%
high expectations for performance (33)	4.8372	1.0675	84.09%
flexibility (1)	4.8140	1.0747	84.64%
emphasizing quality (46)	4.9767	1.2245	84.89%
having a good reputation (48)	4.8605	1.1460	85.30%

Table 13. Core values measures by work group show two groups with high measures and two groups with low measures relative to the rest of the organization.

	High ⇓		High ⇓		Low ⇓			Low ⇓
Work Group	A	B	C	D	E	F	G	H
Core Values Measure	4.911	4.667	4.984	4.542	3.906	4.500	4.719	4.125

The core values were determined using data on existing values. As such, they won't necessarily match the values published in the Strategic Output and Plans from the Manager's Retreat (dated January 11, 1993). The values presented in the retreat document were desired values. However, the core values listed in the table above have face validity with how work gets done at MSL and reflect the meticulosity and work hard/play hard culture (i.e., low risk, high feedback) (cf. Deal & Kennedy, 1982) MSL has espoused and practiced for over a decade. Whereas the specific types of values such as paying attention to detail and being precise aren't mentioned in the retreat document, other values such as emphasizing quality and having a good reputation are embedded throughout the retreat document. The retreat document used words such as "cultivate quality in all we do," "strive to exceed customer expectations," and "demonstrate competence in all we do."

6.4.5.3 Intensity-core values matrix

The surprise findings on the intensity measure (work group E having high intensity and low criterion measures while work group C having low intensity and relatively high criterion measures) and subsequent discovery of the power of the intensity numerator led to the need to assemble a meaningful picture of culture strength using measures developed from aggregated data. The core values measures acted as I had predicted, but I wondered

how MSL's work groups would stack up when examined using both the intensity measure (not the intensity numerator) and the core values measures. I built a core values matrix with the core values measure on the abscissa and the intensity measure on the ordinate. (See Figure 7.)

I used rankings to place work groups in the matrix rather than raw data. The matrix allowed for comparison of one work group relative to the others. This method forced four work groups to be high intensity, four work groups to be low intensity, four work groups to be high core values, and four work groups to be low core values. Therefore, the intensity-core values matrix, as I've designed it, facilitates comparisons *within* the organization rather than with other organizations.

My expectation, prior to the intensity measure finding, was higher intensity and higher core values measures indicate stronger cultures and therefore work groups with higher

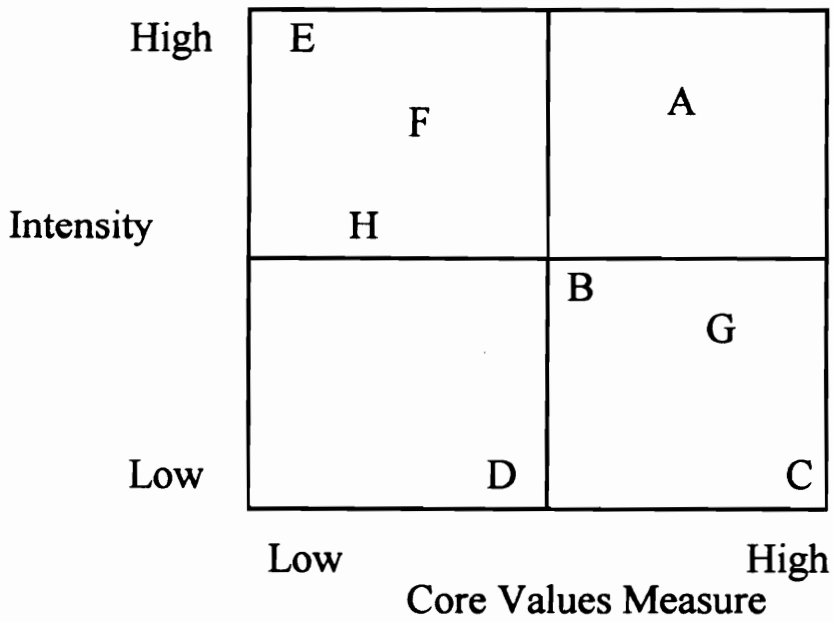

Figure 7. An intensity-core values matrix provides a detailed view into the behavior of culture strength in the MSL work groups.

criterion measures. I found the work groups with higher intensity had lower criterion measures. The work groups having the highest criterion measures fell into the high core values/low intensity quadrant of the matrix. The work groups having the lowest criterion measures fell into the low core values/high intensity quadrant of the matrix.

The structure of the matrix—always showing the groups relative to each other—consistently provides management information for continuous improvement. The work groups in the upper left quadrant should be the targets of interventions to align their values with those desired by the organization (and work group, if defined appropriately). The work groups in the lower right quadrant should be nurtured and appropriate behaviors reinforced to maintain their position.

When I combined the matrix with findings from a Spearman rank order correlation (ρ) of core values and intensity measures with the criterion variables, I gained several insights. (I discuss these correlations and the process behind them in section 6.4.8 of this chapter) First, I found work groups with higher intensity tended to have higher normative commitment and lower group cohesion. The higher normative commitment suggested work group members were committed to the values of the work group. Second, I found work groups with higher core values measures had lower instrumental commitment and higher group cohesion. The lower instrumental commitment suggested work group members were doing their jobs for more than just a paycheck. Examining the normative commitment measure in conjunction with the instrumental commitment measure would offer a fuller picture of commitment to the work group.

The intensity-core values matrix suggested work groups having high core values measures and low intensity tended to have higher criterion measures. The matrix also

Table 14. The effects scale varied little by MSL work group.

Work Group	Mean	Std. Dev.
A	3.43	0.39
B	2.83	0.49
C	3.41	0.50
D	2.73	0.21
E	2.80	0.50
F	3.17	0.38
G	2.85	0.45
H	3.52	0.63

suggested work groups having low core values measures and high intensity tended to have lower criterion measures.

6.4.6 Effects

Before analyzing the data from the effects scale, I calculated its internal consistency. I constructed this effects scale. I found a Cronbach's alpha of 0.7166 using the entire MSL data set.

For each respondent, I calculated an effects scale score by calculating the mean responses for the 10 effects items in the instrument. These effects data were on a scale of 1 to 5, where 5 indicates the least amount of change expected. I calculated these effects scale scores by work group and for MSL overall (Table 14).

The effects scale was not an effective measure of culture strength in this field study. The effects scale had a standardized canonical coefficient of 0.0591. The Spearman rank order correlation coefficients between the effects scale and criterion variables (by work group) were insignificant. I address the effects scale in the Shenandoah field study (Chapter 7) for what I found using a larger sample size.

6.4.7 Desired Behavior[25]

The cultural behavior measure represents the mean of all behavior ratings for all 53 values. I summarized cultural behavior by work group and then correlated cultural behavior with the criterion variables. The cultural behavior variable did not discriminate among the 53 values. I defined a second behavioral variable based on aggregated data. I defined desired behavior as the mean of the behavior scores corresponding to the top desired values. I identified the top desired values using the same procedure used for identifying the core values. I sorted the values from low to high based on the modified coefficient of variation. I found a cut-off point below the top six values (MCV<66%). (In section 6.4.5.2 I discussed the specifics of using MCV to order values data). I chose the values having an MCV less than 66%. The desired values resulting from this analysis were: sharing information freely (15), being fair (18), respecting the rights of individuals (19), being innovative (5), being quick to take advantage of opportunities (6), and taking initiative (28).

For each work group and for the organization overall, I calculated a mean behavioral score for each of the top six desired values. I used these data in the next section to correlate work group measures to the criterion variables.

6.4.8 Relating to Criterion Variables

I then took all the work group measures—intensity, intensity numerator, core values, desired behavior, culture gap, effects, and the canonical variable—and found the

[25]The desired behavior measure is an aggregate measure distinct from the cultural behavior measure described earlier under the canonical correlation.

Spearman rank order correlation coefficient when associated with normative commitment, instrumental commitment, job satisfaction, and group cohesion (Table 15)[26].

I first discuss how I calculated numerical values for the criterion variables. The three criterion variables I used in this research had essentially the same structure. For each of these variables, I found the mean response for the items making up the scales. These means therefore fell along a scale with 1 and 6 at the endpoints. These criterion variables were more straightforward than my culture strength measures mostly because of the criterion scale's simpler structure and because the criterion scales have been used many times in other contexts and have some evidence accrued as to their reliability and validity.

Table 15. The Spearman rank order correlation coefficients showed the culture gap factors enhanced the ability to understand the relationships of the culture strength measures and the criterion variables.

CS Measure	NCOM	ICOM	JOB	GROUP
Intensity	0.905****	0.071	-0.381	-0.643*
Intensity numerator	0.619	-0.667*	0.405	0.976****
Core values	0.452	-0.643*	0.357	0.714*
Cultural behavior	0.690*	-0.310	0.595	0.810**
Desired behavior	0.405	-0.643*	0.595	0.762**
Culture gap	-0.595	0.190	-0.238	-0.810**
Performance	-0.310	0.119	-0.119	-0.619
Reflect/phil	-0.643*	0.024	-0.405	-0.714*
Job	-0.762**	0.024	-0.357	-0.762**
Effects	-0.214	-0.214	0.143	-0.310
Canonical	0.714*	-0.190	0.405	0.881***

*p<.10, **p<.05, ***p<.01, ****p<.005, all two-tailed

Note: CS Measure=culture strength measure, NCOM=normative commitment, ICOM=instrumental commitment, JOB=job satisfaction, GROUP=group cohesion.

[26]I've summarized the various measures by work group and have reported those means and standard deviations in Appendix J.

Employee commitment. I calculated a mean response (for each respondent) for the 12 commitment items together and separate scores for the eight normative commitment items and the four instrumental commitment items.

Job satisfaction. Because this is a single item scale (the Faces Scale), the actual response constituted the scale score.

Group cohesion. After accounting for five reverse-coded items, I calculated a mean response for the 18 group cohesion items.

Whereas culture gap was a reasonably good predictor of the criterion variables, the culture gap factors enhanced the ability to understand the relationships between the culture strength measures and the criterion variables. This tended to support the validity of using a canonical correlation because it did indeed maximize (or at least improve) the relationship between culture strength measures and criterion variables. The cultural behavior measure was also a good predictor, especially of normative commitment (0.690) and group cohesion (0.810).

The group cohesion scale was highly correlated with all the culture strength measures except effects. The strongest correlation (0.976) occurred between the intensity numerator and group cohesion, whereas the next highest was a 0.905 correlation between the intensity measure and normative commitment. Both correlations were significant at $p<.005$. Although these findings were significant, they were based on small sample sizes and nonparametric statistics. Nevertheless, I still wished to capture some observations. The intensity numerator-group cohesion correlation suggests work groups having a high extent of agreement on a small set of values tend to work more cohesively as a group. But those work groups having a high intensity measure (in this field study, indicative of dissatisfaction with the work group) also showed commitment to the organization based

on values, and this was supported by the high positive correlation with normative commitment.

The numerator of intensity appeared as a better predictor of the criterion variables than the intensity measure. This contradicted the finding I extracted from the Calori and Sarnin (1991) study showing intensity positively correlated with performance (assuming my criterion variables behave similarly as performance measures). Stronger cultures tended to rely on more intrinsic forms of motivation, as inferred from the high correlation of culture strength measures with normative commitment. Conversely, weaker cultures tended to rely on more extrinsic forms of motivation, as inferred from the negative correlation of culture strength measures with instrumental commitment. These correlations were not as high as those for the normative commitment relationship.

Although the intensity numerator was a consistent predictor of the criterion variables, the calculations of the intensity numerator using desired values instead of existing values was not useful at all (i.e., did not correlate significantly with the criterion variables). I wondered why this was so. The desired values responses were often very high—five or six on the six-point scale. Because responses were concentrated near an endpoint, the variance of those responses was low. As a consequence of the low variance near an endpoint, the intensity numerator using desired values had a restricted range and this made pulling a trend out of the data difficult. Similarly, I looked at the change in the intensity measure when comparing the measure as calculated using existing values (the definition) to the intensity measure as calculated using desired values. In all cases, the desired values version of intensity was less than the existing values version. This finding could indicate general dissatisfaction with the existing culture because of the amount of change expressed in the responses for the desired values as compared to the existing values (and as captured by the denominator of the intensity measure).

The Spearman ρ showed the correlation of culture strength measures and the commitment dimensions had alternating signs. For example, all the culture strength variables except culture gap (and culture gap factors) and intensity correlated positively with normative commitment and negatively for instrumental commitment. The reverse was true for culture gap (and culture gap factors) and intensity—they were correlated negatively with normative commitment and positively for instrumental commitment. The being reflective/having a clear guiding philosophy factor and the job factor both had significant negative correlations with normative commitment. This suggested as the gap closes for values such as having a clear guiding philosophy, offering praise for good performance, employment security, and others, normative commitment increases, suggesting people are more likely to commit to their work groups based on values when they perceive the gap between the existing values and the desired values as small. The cultural behavior measure had a significant positive correlation with normative commitment, suggesting people were more likely to commit based on values (normative commitment) when they perceived the behavior of others as reflecting those values.

6.5 Interpretation of Culture Strength Measurement at MSL

I again emphasize the small sample size used in the MSL field study and the limited amount of interpretation I have done at this point. Whereas my knowledge of MSL helped me design and adjust my measures, I should not place high levels of confidence on the output. Many of the MSL findings have face validity, especially when examining core values such as paying attention to detail, being adaptable, having high expectations for performance, emphasizing quality, etc.

I used MSL as an advanced pilot study to not only test the analysis procedures, but to gain insight both into the analysis procedures and, to a limited extent, into the culture of MSL and its work groups. I look to a larger sample size to provide greater interpretation in the Shenandoah field study and to allow me to test my procedure more rigorously for measuring culture strength in organizations.

I made several changes in the survey instrument prior to administering to the Shenandoah sample based on what I learned in the MSL field study. I documented those changes in section 7.3 of Chapter 7.

See Chapter 8 for the interpretation of these analyses in the context of both field studies and for the effectiveness of using the culture strength measures.

Chapter 7. Field Study 2: Shenandoah Life Insurance Company

I conducted similar analyses for the Shenandoah field study as used for the MSL field study. I performed many preliminary analyses for the MSL field study that I didn't repeat for Shenandoah. The MSL field study illustrated the basic set of analyses needed to conduct on the Shenandoah data. The results of those analyses suggested other analyses as I investigated expected and surprise findings.

7.1 The Organization

Shenandoah Life Insurance Company ("Shenandoah") is a mutual life insurance company headquartered in Roanoke, Virginia. Shenandoah has 225 full-time employees (12 of whom were out-of-state marketing representatives and therefore not included in my sample) and had $179.7 million in income in 1992 with $573.9 million in managed assets. Shenandoah has policyholders and agents in 20 states and the District of Columbia. Shenandoah's employees represent a range from clerical personnel to high-level managers. Shenandoah management was quick to point out they don't refer to their people as "clerical" workers—they're knowledge workers. Approximately 40% of all Shenandoah employees hold college degrees.

Shenandoah's business hinges on its relationship with its policyholders and insurance agents. Shenandoah's products and services encompass group and individual insurance products, including annuities and disability.

Shenandoah is organized into eight divisions/departments[27] and these are partitioned into cost centers with their own department codes. (For the sake of consistency and clarity, from here on, I refer to Shenandoah's organizational units as divisions.) Shenandoah has eight divisions: administration, president's office, individual marketing, data processing, planning and control, individual insurance services, and group marketing. The divisions appear under a set of codes (S-Z) to protect the confidentiality of responses.

7.2 Sample

I used the entire population of Shenandoah as my sample. At the request of Shenandoah's management, the survey instruments were administered in a series of one-hour sessions in an on-site conference room. This method of administration ensured a high return rate and allowed me to retain control over the survey-taking procedures. This method of administration (especially considering the time investment of one hour per employee) also communicated a message from top management about Shenandoah's commitment to this project and its interest in the results. Shenandoah employees have a history of participating in surveys because Shenandoah management promotes and encourages continuous improvement and values the feedback received from employees.

[27]Shenandoah employees don't have a consistent nomenclature to refer to their organizational units. Sometimes these units are referred to as divisions and other times they're referred to as departments. Whatever they're called, I treated them the same as I did with the work groups in the MSL field study. Shenandoah also has work groups, but these are small groupings of 2-3 people and do not correspond to my use of work group throughout this research. For this chapter to make sense on its own, I used nomenclature Shenandoah employees would understand. Therefore, I refer to their organizational units as divisions and not as work groups.

Approximately 25 employees participated in each one-hour session. These sessions were held over a two-day period (March 10-11, 1993) and produced 171 completed and usable survey instruments for an 80% response rate. Response rates varied from 63% to 100% by division. (See Table 16.)

The Shenandoah field study involved a large enough sample size to provide a greater level of comfort in the inferences drawn from the data. My experience in analyzing the MSL data allowed me to analyze the Shenandoah data more efficiently. For example, I ran a factor analysis on the culture gap scale before running the canonical correlation.

7.3 Instrument Administration and Collection

I administered a modified version of the survey instrument used for MSL (Appendix K). The modifications were minor and did not dramatically affect the items or scales. My instrument and research focused on culture at the division level. At MSL, the term "division" was not well-defined and this allowed me to define divisions as the eight organizational units. At Shenandoah, the term "division" had specific meaning—divisions

Table 16. Shenandoah's response rates by division varied from 63% to 100%.

Division	# Received	Total in Division	Response Rate
S	10	12	83%
T	45	65	69%
U	34	40	85%
V	9	9	100%
W	39	43	91%
X	12	19	63%
Y	15	18	83%
Z	7	7	100%

referred to suborganizations of distinct product line groupings headed by a vice president and represented in the financial reporting system through an assigned set of cost centers. Shenandoah is organized into eight divisions with between 7 and 65 employees each. I therefore changed the words "work group" to "division" wherever they appeared on the instrument. I put the names of the Shenandoah divisions on the survey and allowed a place for respondents to identify their two-digit cost center code. The cost center code allowed positive identification of division affiliation. I made several other minor changes in the survey instrument. In several places, I noticed (and some of my MSL respondents noted) items where the focus was on the *organization* where it should have been on the work group (or division, in Shenandoah's case). I fixed those items.

The data were collected in a series of one-hour sessions on March 10-11, 1993. Shenandoah's top management announced the data collection in their managers' meeting and officers' meeting on March 5. A memo announced the survey to Shenandoah employees, asked for employee participation, and provided a schedule of one-hour sessions for them to attend to complete the survey instrument (Appendix L).

7.3.1 Survey administration process observations

I personally convened each session. The only members of management present were those participating in the survey. I began with the reason for the meeting and stressed the confidentiality of the responses. I then went over the instructions for the survey and let the respondents complete the survey at their own pace. I used a script to ensure all sessions received the same directions (Appendix M)[28]. I answered questions where appropriate but limited this as a control for all sessions. Respondents turned their surveys

[28] I didn't use the exact same words every time nor did I read directly from the script. I wanted a more lively, extemporaneous delivery and I ad-libbed from the script yet anchored my briefing to the script to ensure I covered all points.

in to me upon completion. I collected all completed surveys at the end of the sessions and brought them to the office for analysis.

In the first session I convened at Shenandoah, a member of management was present and fielded questions on the names of their divisions. The list of division names provided to me by Shenandoah management needed some fine-tuning for their employees to mark their affiliation. Specifically, the "VP" preceding many of the division names was unnecessary. The division listed as "VP-CFO" was better known as planning and control. The division listed as "VP-Marketing" was individual marketing. Based on my experience with this first session and the clarifications required on the division names, I incorporated those clarifications into my script. I also made the list of divisions and cost center codes available for those who didn't know one or the other or who just wanted to verify that information.

My strategy of having employees also mark their cost center code (also referred to by Shenandoah employees as their department code) gave me a back-up so I could identify the division from the cost center code. In several cases, respondents only marked the cost center code and left the division item blank. I was able to salvage those surveys. In cases where the respondent only marked the division and not the cost center code, I coded the cost center as missing data. Missing cost center data did not affect my ability to use the data.

Several respondents mentioned putting their cost center code would be the same as putting their name on the survey, because 11 of the 45 cost centers had only one person in that cost center. I explained the cost center code could help in cross-checking divisional membership, and the respondents understood my need for that information. The

completed surveys were the acid test—only one person of 171 didn't provide a cost center code.

Shenandoah employees have a history of taking surveys often. I therefore found they generally had a good attitude toward taking my survey and they were well-experienced in filling out surveys (in terms of both the mechanics of filling them out and the thought patterns required to generate responses).

Administering the survey in person allowed me to observe the respondents while in the process of completing the survey. Even as the respondents assembled and as I briefed the survey I obtained insights into the organization and its culture. People were assigned to these sessions based on the first letter of their surname. This resulted in cross-functional groupings of respondents in each session. I usually allowed 2-3 minutes beyond the scheduled start time before beginning the briefing. The Shenandoah respondents were very prompt and very few people arrived to the conference room after I began the briefing. I noticed a sense of camaraderie among the Shenandoah employees prior to beginning the sessions. In several of the sessions, I had to call the group to order because their conversations filled the room. This observation is especially interesting considering the cross-functional nature of these groups.

The Faces Scale used to measure job satisfaction was the one item people talked about after leaving the session, and they found it amusing when I briefed it along with the rest of the items. I think people found the Faces Scale refreshing among the items from other scales. The literature reported the Faces Scale as a valid measure of job satisfaction when compared with the Job Descriptive Index and the Minnesota Satisfaction Questionnaire. However, my research suggested the Faces Scale didn't behave reliably from one organization to the next.

One person said she could "write a book" about one of the items. I inquired which item and she said #128 (expressing the right attitude to get rewarded). She said how people get rewarded wasn't dependent on what you do, but on your attitude, even if one had a good attitude but did a bad job.

7.3.2 Cultural observations

During my two-day data collection period, I made several cultural observations. Whereas this brief period would never suffice for my understanding of the Shenandoah culture, the few items I did discover added to my understanding and potentially added to the Shenandoah employees' understanding of their culture. When I approached the Shenandoah building on Brambleton Avenue in Roanoke, I was struck by the resemblance the structure had to a school. The building was designed for Shenandoah and was built in the forties. The building has a tall central structure with two wings—one on each side. There are three stories in the building, much as a school would have. Inside the building, the school feeling continues—yellow painted cinder block walls, shiny floors, and a subsidized employee cafeteria (e.g., entrees $1.15) complete with a stage and curtain. The executive suite area is carpeted and furnishings are more elegant (hardwood desks and tables, incandescent lamps with lampshades instead of overhead fluorescent lights).

Shenandoah's concern for its employees and its community is exhibited in other manners. On the first day of my data collection, a blood pressure screening was being held for all employees. I was informed other types of on-site screenings occurred on a somewhat regular basis. A wellness committee organizes these events. The Shenandoah building has a workout room complete with cardiovascular exercise equipment and a room for aerobics classes. Shenandoah's concern even extends to its employees' safety entering and exiting the Shenandoah campus—Shenandoah has its own traffic light on Brambleton

Avenue triggered by a switch on the roadway linking the parking lot and Brambleton Avenue.

"Casual days" are planned once a month and are very popular. On "casual day," nearly everybody—exempt and hourly alike—dresses informally. One lunch time discussion at my table in the cafeteria concerned the rescheduling of a casual day that had been cancelled because snow had closed the offices. Casual days are an employee reward when the United Way goals are met. One could say every day is casual day because people refer to each other by first name, from the janitor all the way up to the president.

7.4 Data Analysis and Results

Prior to data entry, the completed survey instruments were coded with a sequential identifier (e.g., 1, 2, 3) to allow for data checking and verification (just as I did for MSL). The data from the surveys were then entered into a data base and uploaded to SAS for analysis. I used the same basic data analysis process for Shenandoah as I did for MSL so I didn't repeat every step here. The reader should consult Chapter 6 for those details. I report here the general steps, outcomes of those steps, new analyses conducted just for Shenandoah, and the results of these analyses.

7.4.1 Internal consistency

I checked each of the scales used for their reliability using a test of internal consistency. I used Cronbach's alpha to see if people responded to the scales in a consistent manner. If scales were reliable (i.e., were internally consistent), then I could proceed with my analyses.

I performed these analyses using the full Shenandoah sample of 171 returned instruments. I checked reliability for the existing values items, the desired values items, the cultural behavior scale, the effects scale, the commitment scales (both normative and instrumental commitment), and the group cohesion scale.

All scales had acceptable internal consistency in their tested form (i.e., $r \geq 0.70$) except for instrumental commitment and the effects scale, although the effects scale (10 items) had a Cronbach's alpha of 0.6915 (see Table 17). The existing values scale (53 items) had a Cronbach's alpha of 0.9567. The desired values scale (53 items) had a Cronbach's alpha of 0.9434. The cultural behavior scale had a Cronbach's alpha of 0.9599. The normative commitment scale (8 items) had a Cronbach's alpha of 0.8935. The instrumental commitment scale (4 items) had a Cronbach's alpha of 0.5502[29]. The group cohesion scale (18 items) had a Cronbach's alpha of 0.9326. I concluded the scales used in my research (with the exception of instrumental commitment) had acceptable levels of internal consistency (meaning people responded to the scales in a consistent manner) and proceed with my analyses. Because my research is exploratory, I retained the instrumental

Table 17. All scales used in the Shenandoah study had acceptable reliability, although the reliability of the instrumental commitment scale was relatively lower.

Scale	α	mean	s.d.
Existing values	0.9567	4.337	0.6278
Desired values	0.9434	5.003	0.4320
Effects	0.6915	3.559	0.5237
Cultural behavior	0.9599	71.16%	16.87
NCOM	0.8935	4.1229	0.9207
ICOM	0.5502	2.8176	0.7706
Group cohesion	0.9326	4.1965	0.7518

[29] I used the Spearman-Brown prophecy formula to estimate the reliability of the instrumental commitment scale if it had 10 item (instead of four) of similar quality. The Spearman-Brown prophecy formula produced an estimate of 0.75 for the theoretical 10-item scale.

commitment scale items, but the reader should realize any reported findings involving the instrumental commitment scale should be interpreted knowing the scale does not have as high a level of internal consistency as the other scales used in this research.

7.4.2 Canonical correlation analysis

I followed the same process for analyzing existing values and culture gap using canonical correlation for Shenandoah as I did for MSL. I repeat the listing of those steps here for the reader's convenience.

1. Compute Cronbach's alpha using the 53 items. Note items with negative item-to-total correlations.
2. Run a factor analysis using all 53 items. Use a varimax rotation for clarity.
3. Identify factors having an eigenvalue of 2.0 or higher. Select items with loadings of 0.55 or higher for inclusion in the factors.
4. Name the factors.
5. Define the factors in the SAS program so they can be calculated for each respondent.
6. Run a canonical correlation using the factors from the values items (culture gap), rather than the overall culture gap score. (Culture gap was such a strong factor in preliminary factor analyses that I decided to identify what subscores might exist among the 53 items.)
7. Look at the canonical variables for those with eigenvalues of 1.0 or higher and $p \leq 0.10$.
8. Translate the output of the canonical correlation.
   a. mechanical translation: Use the standardized canonical coefficients to write the equation for the canonical variable using the predictor variables.
   b. interpretive translation: Look at the correlation of the culture strength measures with the canonical variable to interpret the canonical correlation. The interpretation of the variates is based on those variables having a high correlation with the variates, rather than those that are components of the variables.

I demonstrate these steps in action as I discuss my analysis of the Shenandoah data.

The factor analysis (171 surveys) using the Shenandoah data produced four factors for the culture gap scale with eigenvalues of 2.0 or higher. I included items loading 0.40 or higher in the definition of factors[30]. The factors and the items loading onto those factors are shown in Table 18. I used the four factors having eigenvalues of 2.0 or higher in the canonical correlation. These factors were: performance, people, job, and fit.

Table 18. The first four factors for the full Shenandoah data set had these values loaded 0.40 or higher. (Factor loadings are in parentheses. Percentages refer to the proportion of variance explained by each factor.)

Factor 1: Performance 31.95%	**Factor 2: People 6.50%**
action-oriented (0.72) willing to experiment (0.68) taking initiative (0.68) innovative (0.66) high performance (0.65) achievement-oriented (0.63) risk taking (0.62) analytical (0.62) opportunities (0.61) decisive (0.60) aggressive (0.59) adaptability (0.57) flexibility (0.53) competitive (0.50) being demanding (0.46) results-oriented (0.45)	being supportive (0.76) being calm (0.72) individual rights (0.70) being tolerant (0.69) being fair (0.65) people-oriented (0.59) sharing information (0.55) team-oriented (0.51) being easy going (0.48) enthusiasm for the job (0.47) one culture (0.42) confronting conflict (0.41)
Factor 3: Job 5.36%	**Factor 4: Fit 4.36%**
high pay (0.81) secure employment (0.79) praise for performance (0.76) professional growth (0.76)	fitting in (0.76) developing friends (0.74) low conflict (0.53) collaboration (0.52)

[30]I used items with loadings ≥ 0.55 for MSL because of the small sample size. I wanted to include only those items showing the greatest potential for explaining variance in the results. With Shenandoah, I had a larger sample size approaching 200—the level where one can feel comfortable in the ability of a factor analysis to produce reliable results. Therefore, for Shenandoah I included items whose loadings were 0.40 or greater.

Together, these four factors accounted for 48.17% of the variance in the culture gap scale (Figure 8).

To facilitate the construction of tables, I used abbreviated phrasings for the 53 values items. The reader should refer to the full names of the values in the survey instrument located in Appendix K.

The canonical correlation analysis from the final Shenandoah data produced a first canonical correlation of 0.6628 ($p \leq 0.0001$), compared to the largest simple correlation of 0.6137, between the people factor and group cohesion. Thus, the canonical correlation produced a set of weights resulting in a 0.05 improvement in the correlation coefficient. The second canonical correlation was 0.4041 ($p \leq 0.0006$). I discuss the two canonical variables separately. I also performed the canonical correlation including the core values measure to show the effect of that measure.

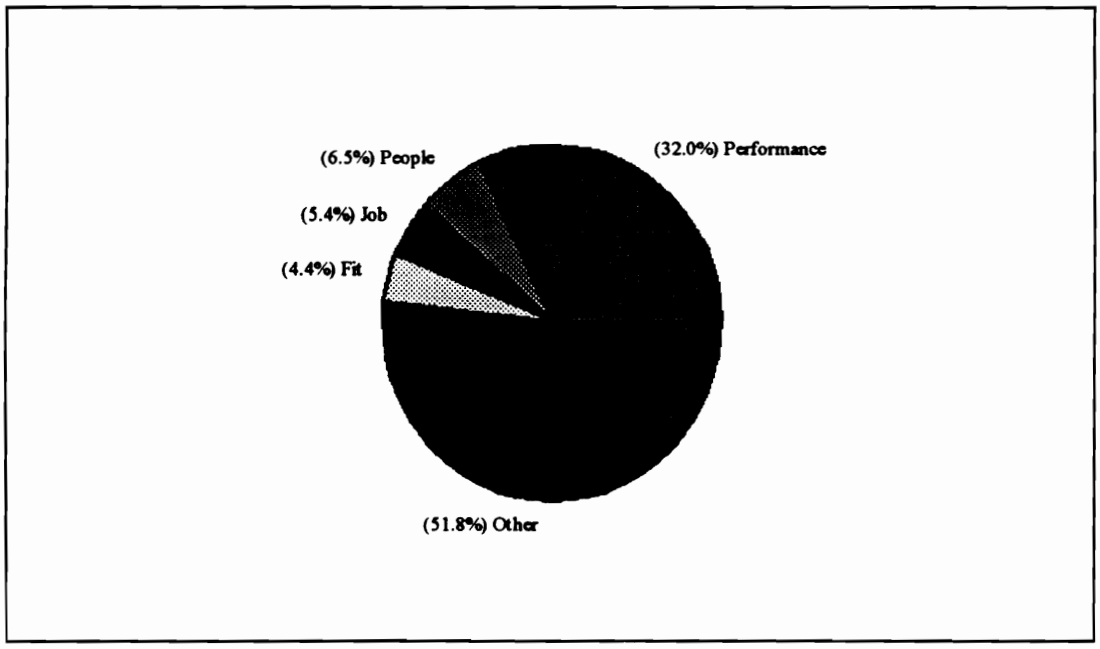

Figure 8. Four factors explained nearly 44% of the variance in the culture gap scale.

7.4.2.1 First canonical variable

Without the core values measure

The people factor was the only culture strength measure having a standardized canonical coefficient (SCC) greater than 0.40 and group cohesion was the only criterion variable with an SCC greater than 0.40. However, the interpretation of the people factor shows it subsumed the cultural behavior measure and the other three culture gap factors used in the analysis (performance, job, and fit). The group cohesion measure subsumed the normative commitment measure and the job satisfaction measure. This analysis resulted in a canonical R^2=0.4393, meaning (in the first canonical variable) the culture strength measures shared 43.93% of the variance with the criterion variables.

This canonical correlation showed the relative weights for the culture strength measures and suggested the people factor and the cultural behavior measure were the strongest predictors of the criterion variables. The other four variables contributed to the ability to predict, but to a lesser extent. The Shenandoah data showed the effects scale with a slightly higher SCC (-0.0886), but this still wasn't important compared with the people factor and cultural behavior.

I then built the equation for the canonical variable using the SCCs for the culture strength measures. I used the *standardized* canonical coefficients so the reader can interpret the measures relative to each other. However, to calculate the canonical variable for each respondent, I used the *raw* canonical coefficients. I calculated the canonical variable for each respondent and aggregated by division for comparison to measures of intensity and core values. (I report on this analysis later in this chapter.) The equation for the first canonical variable was (using the raw canonical coefficients): 0.3801(BEHAV) - 0.0886(EFFECTS) + 0.1758(PERFRMCE) - 0.8895(PEOPLE) - 0.0932(JOB) + 0.1093(FIT) = 0.1115(NCOM) + 0.0819(ICOM) + 0.1065(JOBSATIS) +

0.8722(GROUP). (BEHAV is the cultural behavior measure derived from the mean of all 53 behavior ratings. EFFECTS is the mean score from the effects score. PERFRMCE, PEOPLE, JOB, and FIT are the top four culture gap factors. NCOM is normative commitment whereas ICOM is instrumental commitment. JOBSATIS is the faces scale for job satisfaction. Finally, GROUP is the group cohesion scale.)

I interpreted this first canonical correlation as follows. As the culture gaps decrease (i.e., existing values approach desired values) for the people factor and as the people's behavior increasingly reflects the surveyed values, this represents a stronger culture and this stronger culture is evidenced by the increase in the criterion variables of normative commitment and group cohesion.

Including the core values measure

When I included the core values measure in the canonical correlation, I found core values second to the people factor in terms of SCC. The people factor and the core values measure were the only culture strength measures having SCC greater than 0.40. Group cohesion was the only criterion variable with an SCC greater than 0.40. The interpretation of the people factor and the core values measure shows they subsumed the cultural behavior measure and the other three culture gap factors used in the analysis (performance, job, and fit). The group cohesion measure subsumed the normative commitment measure and the job satisfaction measure. This analysis resulted in a canonical R^2=0.4572, nearly two percentage points higher than without the core values measure.

This canonical correlation showed the relative weights for the culture strength measures and suggested the people factor and the core values measures were the strongest predictors of the criterion variables. The other four variables contributed to the ability to predict, but to a lesser extent. The Shenandoah data showed the effects scale with a SCC

nearly the same as for the analysis run without the core values measure (0.0840)—still insignificant compared with the people factor and core values measure.

I then built the equation for the canonical variable (including the core values measure) using the SCCs for the culture strength measures. Table 19 shows the standardized canonical coefficients. Table 20 shows the bivariate correlations between the culture strength measures and the criterion variables. Table 21 lists descriptive statistics for each scale used in the canonical correlation. The equation for the first canonical variable was (using the raw canonical coefficients): 0.1896(BEHAV) - 0.0840(EFFECTS) + 0.4085(CORE) + 0.2852(PERFRMCE) - 0.7797(PEOPLE) - 0.1162(JOB) + 0.1025(FIT) = 0.1524(NCOM) + 0.0843(ICOM) + 0.1735(JOBSATIS) + 0.7942(GROUP). (BEHAV is the cultural behavior measure derived from the mean of all 53 behavior ratings. EFFECTS is the mean score from the effects score. CORE is the core values measure. PERFRMCE, PEOPLE, JOB, and FIT are the top four culture gap factors. NCOM is normative commitment whereas ICOM is instrumental commitment. JOBSATIS is the faces scale for job satisfaction. Finally, GROUP is the group cohesion scale.)

I interpreted this first canonical correlation as follows. As the culture gaps decrease (i.e., existing values approach desired values) for the people factor and as the people's behavior increasingly reflects the surveyed values, this represents a stronger culture and this stronger culture is evidenced by the increase in the criterion variables of normative commitment and group cohesion. The inclusion of the core values measure shifted some of the weights. Core values appeared as a relatively good predictor of the criterion variables. The people factor still had the highest weight, yet the weight of the cultural behavior measure dropped from 0.3801 to 0.1896. The addition of the core value measure raised the canonical R^2 from 0.4330 to 0.4801.

Table 19. Adding core values to the canonical correlation showed core values as an important culture strength measure.

Culture Strength Measures			Criterion Variables		
Variable	**Coefficient**	**r**	**Variable**	**Coefficient**	**r**
BEHAV	0.1896	0.66	NCOM	0.1524	0.79
EFFECTS	-0.0840	-0.22	ICOM	0.0843	-0.24
CORE	0.4085	0.76	JOBSATIS	0.1735	0.70
PERFRMCE	0.2852	-0.53	GROUP	0.7942	0.98
PEOPLE	-0.7797	-0.89			
JOB	-0.1162	-0.53			
FIT	0.1025	-0.57			

Note: The statistic r denotes the correlation of the variable with the canonical variable. ($\lambda = 0.4007$, $p < 0.0001$, $R^2 = 0.4801$)

Table 20. Bivariate correlations between culture strength measures and the criterion variables provided a benchmark for the canonical correlation results.

	NCOM	ICOM	JOBSATIS	GROUP
BEHAV	0.3470	-0.1753	0.3015	0.4652
EFFECTS	-0.1960	-0.0277	0.0218	-0.1569
CORE	0.4366	-0.1650	0.4076	0.5109
PERFRMCE	-0.3172	0.1367	-0.2355	-0.3631
PEOPLE	-0.4567	0.1324	-0.3927	-0.6137
JOB	-0.3878	0.1500	-0.3287	-0.3351
FIT	-0.2030	0.1053	-0.1496	-0.4370

Table 21. Descriptive statistics provide a basis for the variables used in the canonical correlation.

Variable	Mean	Std. Dev.
BEHAV	71.1574	16.8676
EFFECTS	3.5597	0.5237
CORE	4.8758	0.6617
PERFRMCE	0.9008	0.6595
PEOPLE	1.0385	0.8158
JOB	1.8694	1.2234
FIT	0.7576	0.7484
NCOM	4.1229	0.9207
ICOM	2.8176	0.7706
JOBSATIS	7.8110	2.2335
GROUP	4.1966	0.75118

7.4.2.2 Second canonical variable

Without the core values measure

The second canonical correlation was 0.4041 (p=0.0006). By definition, the second canonical variable is independent of the first canonical variable. This second canonical variable showed the job and fit factors having high weights relative to the other culture strength measures. On the criterion variable side of the equation, normative commitment, job satisfaction, and group cohesion had high standardized weights (1.1167, 0.6047, and -1.2839, respectively). Job satisfaction had a much higher weight than in the first canonical correlation analysis. The sign on the group cohesion weight was harder to interpret, however.

The signs on the weights suggested as the gap in job-related values (as defined by the job factor) decreases, group cohesion decreases. This relationship between the job factor and group cohesion implied a reduction in culture gap would be accompanied by lower group cohesion. Normative commitment had a positive weight and it increased as the culture gap factors decreased. (The instrumental commitment weight [-0.0372] was too small to be concerned about its sign.) However, these difficult to interpret findings may be the signal of other unexpected findings and new analyses may help surface a plausible interpretation.

The fit factor had the highest weight (1.0514). The interpretation of the fit factor shows it subsumed the job factor. On the criterion side, normative commitment and group cohesion subsumed the job satisfaction measure. This analysis resulted in a canonical R^2=0.1633.

This second canonical correlation suggested the job and fit factors were the strongest predictors of the criterion variables. The other four variables contributed to the ability to

predict, but to a lesser extent. The effects scale had a lower SCC (-0.0799)—still unimportant compared with the job and fit factors.

I then built the equation for the second canonical variable using the SCCs for the culture strength measures. I calculated the canonical variable for each respondent and aggregated by division for comparison to measures of intensity and core values. (This analysis appears later in the chapter.) The equation for the second canonical variable was (using the raw canonical coefficients): -0.0552(BEHAV) - 0.0799(EFFECTS) - 0.1870(PERFRMCE) - 0.1889(PEOPLE) - 0.7259(JOB) + 1.0514(FIT) = 1.1167(NCOM) - 0.0372(ICOM) + 0.6047(JOBSATIS) - 1.2839(GROUP). (BEHAV is the cultural behavior measure derived from the mean of all 53 behavior ratings. EFFECTS is the mean score from the effects score. PERFRMCE, PEOPLE, JOB, and FIT are the top four culture gap factors. NCOM is normative commitment whereas ICOM is instrumental commitment. JOBSATIS is the faces scale for job satisfaction. Finally, GROUP is the group cohesion scale.)

Including the core values measure

When I included the core values measure in the canonical correlation, I found for the second canonical variable the core values measure was a distant third place in terms of the SCCs of the job and fit factors. The second canonical correlation with the core values measure was 0.4134 (p=0.0016). This second canonical variable showed the job and fit factors having high weights relative to the other culture strength measures. On the criterion variable side of the equation, normative commitment, job satisfaction, and group cohesion had high weights (1.0699, 0.6408, and -1.3327, respectively). The sign on the group cohesion weight was still negative, adding to the difficulty of interpretation. Two of the criterion variables taking on weights greater than one was due to the sample size being on the low end of acceptability for a factor analysis.

Again, a reduction in culture gap was accompanied by lower group cohesion. Normative commitment had a positive weight and it increased as the culture gap factors decreased. (The instrumental commitment weight [-0.0371] was too small to be concerned about its sign.) However, these difficult to interpret findings may be the signal of other unexpected findings and new analyses may help surface a plausible interpretation.

The fit factor had the highest weight (0.9932). The interpretation of the fit factor shows it subsumed the job factor. On the criterion side, normative commitment and group cohesion subsumed the job satisfaction measure. This analysis resulted in a canonical R^2=0.1709. Adding core values to the second canonical correlation produced a canonical R^2 nearly one percentage point higher than the second canonical correlation run without the core values measure.

I then built the equation for the second canonical variable (including the core values measure) using the SCCs for the culture strength measures. (See Table 22.) The equation for the second canonical variable was (using the raw canonical coefficients): - 0.2059(BEHAV) - 0.0520(EFFECTS) + 0.2754(CORE) - 0.1105(PERFRMCE) - 0.0575(PEOPLE) - 0.6971(JOB) + 0.9932(FIT) = 1.0699(NCOM) - 0.0371(ICOM) + 0.6408(JOBSATIS) - 1.3327(GROUP). (BEHAV is the cultural behavior measure derived from the mean of all 53 behavior ratings. EFFECTS is the mean score from the effects score. CORE is the core values measure. PERFRMCE, PEOPLE, JOB, and FIT are the top four culture gap factors. NCOM is normative commitment whereas ICOM is instrumental commitment. JOBSATIS is the faces scale for job satisfaction. Finally, GROUP is the group cohesion scale.)

I interpreted this second canonical correlation as follows. As the culture gaps increase (i.e., existing values become further from desired values) for the people and fit

Table 22. Adding core values to the second canonical variable showed the job and fit factors were the best predictors of the criterion variables, followed by core values.

Culture Strength Measures			Criterion Variables		
Variable	**Coefficient**	**r**	**Variable**	**Coefficient**	**r**
BEHAV	-0.2059	-0.12	NCOM	1.0699	0.46
EFFECTS	-0.0520	0.03	ICOM	-0.0371	-0.07
CORE	0.2754	0.13	JOBSATIS	0.6408	0.43
PERFRMCE	-0.1105	-0.03	GROUP	-1.3327	-0.17
PEOPLE	-0.0575	0.18			
JOB	-0.6971	-0.45			
FIT	0.9932	0.64			

Note: The statistic r denotes the correlation of the variable with the canonical variable. ($\lambda = 0.7708$, $p < 0.0016$, $R^2 = 0.1709$)

factors, normative commitment decreases and group cohesion increases. I expected group cohesion would decrease with any increase in culture gap. I also expected a decrease in the job factor of culture gap to be accompanied by increases in normative commitment and job satisfaction rather than decreases. The addition of the core values measure to the canonical correlation had a moderate effect on the second canonical variable, but had a much greater effect on the first canonical variable. I leave the interpretation of the second canonical variable to future research and focused my effort on understanding the first canonical variable in the context of the five culture strength measures.

7.4.3 Intensity and core values

Not all the culture strength measures could be analyzed using the canonical correlation procedure because they relied on aggregated data (e.g., top eight values). The canonical correlation procedure requires the ability to use data attributable to each respondent, rather than to each division. (If I had 30, 40, or hundreds of divisions, I could conduct a canonical correlation using division data.) The intensity and core values

measures both rely on aggregated data and could not be analyzed by the canonical correlation[31]. However, I integrated the canonical correlation results into this analysis by calculating the canonical variable for each respondent, aggregating these into a canonical variable for each division, and then computing a Spearman rank order correlation coefficient between several culture strength measures (including the canonical variable) and the criterion variables.

7.4.3.1 Intensity

Just as I did for MSL, I sorted the descriptive statistics (mean and standard deviation) for each of Shenandoah's existing values from high to low based on the mean extent of agreement with each value. I then determined a cut-off point for the overall organization and for each division using the mean. This cut-off point fell between the eighth and ninth values, so the intensity calculations for Shenandoah included eight values, compared to the seven used for the intensity calculations for MSL. Appendix N has the sorted list of values by division used in the analysis of intensity.

The intensity measure is the average of the mean extent of agreement scores for the top eight (or other suitable number) of values under the existing culture divided by the average of the mean extent of agreement for all 53 values under the existing culture. I've calculated intensity measures for each of Shenandoah's divisions. These intensity scores are reported in Table 23 along with values making up those scores.

I analyzed the Shenandoah data using the same analyses used for MSL, but I recognized the size of the Shenandoah sample (n=171) provided a higher level of comfort in the factor analyses and resultant canonical correlations compared to the results of analyzing the smaller (n=43) MSL sample.

[31]As mentioned earlier, I included core values in the canonical correlation merely as an exploratory exercise.

Table 23. The values making up the intensity scores help characterize the culture of Shenandoah's divisions.

	Division			
	S	T	U	V
Values	12 detail 13 precise 46 quality 48 good reputation 10 rule-oriented 11 analytical 3 stability 9 careful 42 collaboration 50 results 53 organized	14 team-oriented 48 good reputation 12 detail 46 quality 13 precise 9 careful 49 social resp. 50 results	11 analytical 33 high performance 46 quality 12 detail 14 team-oriented 50 results 13 precise 2 adaptability	46 quality 12 detail 9 careful 13 precise 48 good reputation 1 flexibility 33 high performance 3 stability 32 ind. resp.
intensity	1.1655	1.1533	1.1672	1.1769
intensity numerator	5.2250	5.0306	5.2204	5.3194

	Division			
	W	X	Y	Z
Values	46 quality 14 team-oriented 1 flexibility 2 adaptability 3 stability 48 good reputation 20 tolerant 40 friends	46 quality 50 results 1 flexibility 20 tolerant 2 adaptability 3 stability 5 innovative 12 detail	46 quality 1 flexibility 19 individual rights 33 high performance 30 achievement 40 friends 48 good reputation 22 easy going	9 careful 48 good reputation 36 secure employ. 46 quality 12 detail 13 precise 37 praise 3 stability
intensity	1.1147	1.1428	1.1374	1.2298
intensity numerator	4.7404	4.9915	4.7667	4.6964

Note: Some work groups have more than eight values because of ties. Only eight values were used in the calculation of intensity and numerator of intensity measures. Numbers refer to values in the survey instrument.

Division Z, ranked in the middle by Shenandoah management, had a higher intensity score than all other divisions. Division Z had the lowest intensity numerator. I investigated why this was so, at least numerically. Their core values measure was next to the lowest among all Shenandoah divisions. I found Division Z responded lower as a group to the values items. A review of the existing values means showed only one value with a mean above 5.0. Three other divisions had all eight values used in the intensity calculation with means above 5.0, with one division having six values and another having five values with means above 5.0. Two divisions (W and Y) had no values with means above 5.0 and both their intensity measure and intensity numerator were among the lowest of the eight divisions.

As in the case of MSL, intensity alone was not a sufficient measurement for culture strength. I again plotted the intensity measure against the core values measure. I expected this plot to differ from the MSL plot because of the different behavior of the intensity measure. The plot was indeed different. I discuss the intensity-core value relationship later in this chapter.

To calculate intensity, I sorted the data by divisions and then by mean (high to low) and by standard deviation (low to high). Recall the definition of intensity as the mean of the top values (as determined by mean score for each value) in the organization divided by the mean response for all 53 values. I used the top eight values to calculate intensity. The data suggested eight was a reasonable cut-off point where differences between the eighth and ninth means existed.

In several cases, even the sort by mean and standard deviation didn't produce an area where a clear cut could be made. This didn't affect the numerical calculations but it did

affect the interpretation. Instead of intensity representing eight values, it represented all values to the point where the tie was broken.

I didn't find an inverse relationship between intensity and the criterion measures of divisions for Shenandoah like I did for MSL. Correlations between intensity measures and the Shenandoah management rankings[32] for divisions were insignificant and therefore did not add to the understanding of the intensity-criterion measure relationship.

I'll test the these values as presented by division for the Shenandoah managers' ability to identify the corresponding divisions when presented with just the top eight values. However, this exercise falls outside the scope of this work and will be reported elsewhere. Because I lack detailed knowledge of the Shenandoah organization, I'm not able to perceive the illuminating nature of these values as I was able to do for the MSL data.

7.4.3.2 Core values

For the entire organization, I identified the top eight values using a modified coefficient of variation (MCV) statistic (Table 24). I arrived at the top eight values (as opposed to the top seven or the top nine) by inspecting the existing values data from Shenandoah and finding a cut-off point based on the MCV. The cut-off point corresponded to an MCV≤83%. The values with MCV less than or equal to 83% were then identified as core values.

Then, for each division, I found the average of the means for each of the core values. This gave me a measure of how strongly these core values are held throughout the organization's divisions. These core values measures by division are presented in Table 25.

[32] I had two members of Shenandoah's management provide rankings of the Shenandoah divisions. These managers performed their rankings based on their assessment of division functionality.

Table 24. I identified eight core values for Shenandoah using the modified coefficient of variation. (Numbers in parentheses refer to the value number in the survey instrument. The full list is in Appendix O.)

Value	Mean	Std. Dev.	MCV
emphasizing quality (46)	5.0647	0.9493	77.98%
being careful (9)	4.8655	0.8809	79.76%
results-oriented (50)	4.8353	0.8817	80.28%
having a good reputation (48)	4.9290	0.9855	80.86%
paying attention to detail (12)	4.9059	0.9806	81.14%
being socially responsible (49)	4.7633	0.8747	81.34%
stability (3)	4.7310	0.8528	81.44%
being precise (13)	4.8343	0.9739	82.20%

Division V had the highest core values measure. This division worked closely with the president and the high core values measure potentially represents the influence of the president on this division. The influence of an organization's top executive and/or founder has been cited as having a major influence on the culture of an organization (Schein, 1983).

The core values were determined using data on existing values. As such, they won't necessarily match the values published in the "Blueprint for the 90s" document[33]. The values presented in the "Blueprint" document were desired values. The "Blueprint" document used words such as "operate with integrity and ethical behavior," "treat each other with dignity and respect," and "strive for excellence in all that we do." Whereas the specific types of values such as being careful and being results-oriented aren't specifically mentioned in the "Blueprint," those and other values are suggested by the "Blueprint" and the 1992 Shenandoah annual report.

[33]The "Blueprint for the 90s" document presents the corporate mission, basic beliefs, guiding principles, strategy/major areas of emphasis, and organizational considerations for implementation.

Table 25. Core values measures by division show V and S with the highest core values measures and Y and Z with the lowest core values measures.

	High ⇓			High ⇓			Low ⇓	Low ⇓
Work Group	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**
Core Values Measure	5.157	4.963	5.022	5.206	4.648	4.865	4.514	4.571

The core value of quality is strung throughout the "Blueprint" in reference to quality products and superior customer service. Sound, conservative fiscal policy is communicated through the annual report and reflects the core values of stability and being careful. This conservative fiscal policy also supported the risk-taking value being one of the lowest rated values throughout Shenandoah (50th out of 53 values). The "Blueprint" mentioned several community service goals and Shenandoah's commitment to civic and charitable endeavors, reflecting the core value of social responsibility.

7.4.3.3 Intensity-core values matrix

I used the intensity and core values data (by division) from Shenandoah and placed them in the intensity-core values matrix. (See Figure 9.)

The intensity-core values matrix constructed for MSL suggested work groups with high intensity and low core values had low criterion measures whereas work groups with low intensity and high core values had high criterion measures. The Shenandoah data did not support these findings. The intensity-core values matrix was not as helpful in analyzing the Shenandoah data as it was for the MSL data. The implication of the Shenandoah finding was the intensity-core values matrix may not be a reliable tool for helping understand the interaction between intensity and core values when measuring culture strength.

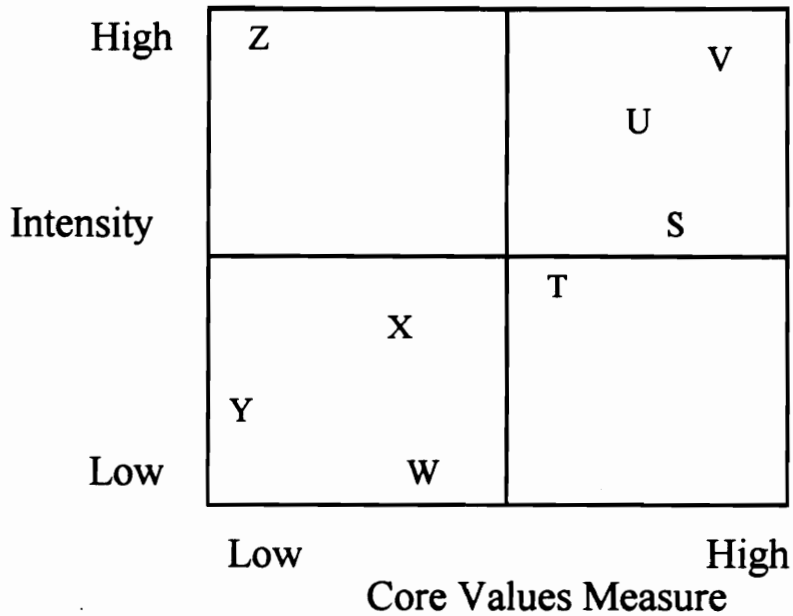

Figure 9. An intensity-core values matrix provided a detailed view into the behavior of culture strength in the Shenandoah divisions.

7.4.5 Effects

Before analyzing the data from the effects scale, I calculated its internal consistency. I constructed this effects scale and the Shenandoah field study is my second use of this scale. I found a Cronbach's alpha of 0.6915 using the entire Shenandoah data set.

For each respondent, I calculated an effects scale score by calculating the mean responses for the 10 effects items in the instrument. These effects data were on a scale of 1 to 5, where 5 indicates the least amount of change expected. I calculated these effects scale scores by division and for Shenandoah overall (see Table 26).

The effects scale did not prove to be an effective measure of culture strength in this field study, although it had a higher weight than in the MSL study. The effects scale had a standardized canonical coefficient of -0.0886. The Spearman rank order correlation

Table 26. Shenandoah's divisions perceive external forces differently based on effects scale measurement.

Work Group	Mean	Std. Dev.
S	3.74	0.56
T	3.72	0.54
U	3.31	0.51
V	3.56	0.59
W	3.51	0.56
X	3.72	0.43
Y	3.55	0.48
Z	3.72	0.29

coefficients between the effects scale and criterion variables (by division) were insignificant, although the correlation with job satisfaction was -0.405. The larger sample size afforded by the Shenandoah study did show an increase in the effects scale canonical coefficient, but the weights of the other variables were much higher in comparison.

7.4.6 Desired behavior

The cultural behavior measure represents the mean of all behavior ratings for all 53 values. Cultural behavior was summarized by division and then correlated with the criterion variables. The cultural behavior variable did not discriminate among the 53 values. I defined a second behavioral variable based on aggregated data. I defined desired behavior as the mean of the behavior scores corresponding to the top desired values. I identified the top desired values using the same procedure I used for identifying the core values. I sorted the values from low to high based on the modified coefficient of variation. I found a cut-off point below the top six values (MCV<66%). (In section 7.4.3.2 I discussed the specifics of using MCV to order values data). I chose the values having an MCV less than 66%. The desired values resulting from this analysis were: sharing

information freely (15), being fair (18), emphasizing quality (46), being team-oriented (14), respecting the rights of individuals (19), being precise (13), having a good reputation (48), and being supportive (24).

For each division and for the organization overall, I calculated a mean behavioral score for each of the top eight desired values. I then used the overall mean for those eight behavioral scores to produce the desired behavior measure. I used the desired behavior measure in the next section to correlate division measures to the criterion variables.

7.4.7 Relating to criterion variables

I consider the critical variables indicative of a division's performance, although my perspective may differ from other researchers. I portrayed the criterion variables by division in Figure 10. I calculated Spearman rank order correlation coefficients between the culture strength measures and the criterion variables (Table 27)[34]. I used scores for these measures as calculated at the division level. I therefore had a sample size of eight for the Spearman correlation.

These correlations showed some different results than those obtained for MSL[35]. For MSL, I found the canonical variable was the best predictor across all criterion variables. The Shenandoah data showed culture gap was a better predictor than the first canonical variable. However, culture gap was only slightly better than the canonical in the correlation with normative commitment (-0.690 for culture gap vs. 0.595 for the canonical). The correlations for instrumental commitment were too small or too few to be of concern.

[34]I've summarized the various measures by work group and have reported those means and standard deviations in Appendix P.

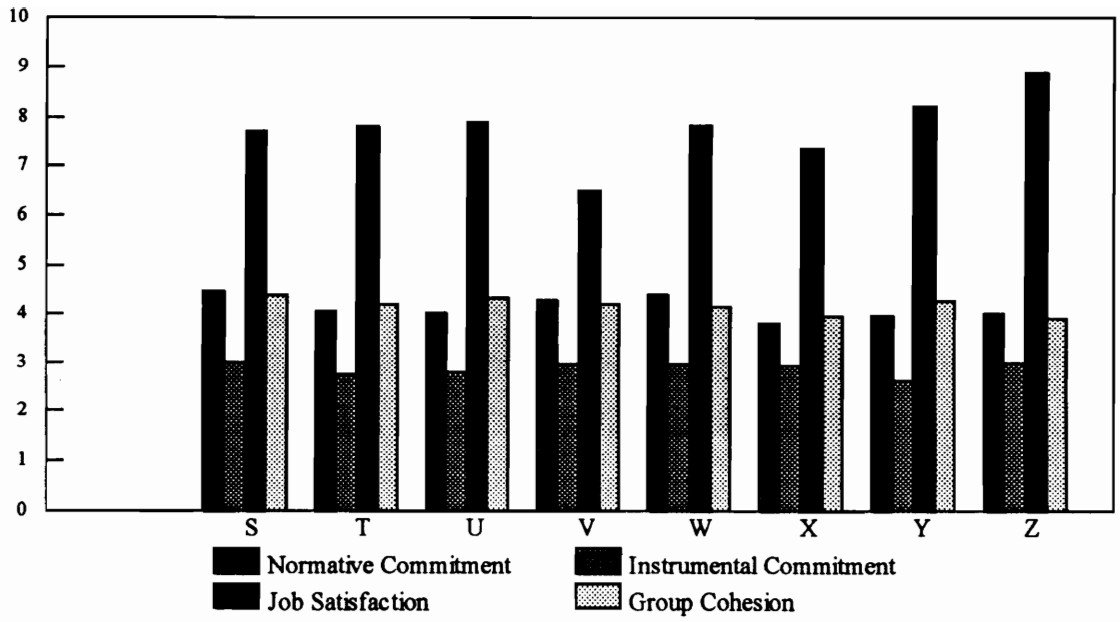

Figure 10. Division level data show differing levels of criterion variables.

I produced a scatter plot to illustrate the relationship between culture gap and group cohesion. This plot, shown in Figure 11, illustrates the negative correlation (-0.738) between culture gap and group cohesion. The interpretation of this plot suggested divisions with smaller culture gap measures have higher group cohesion.

The correlations between the culture strength measures and job satisfaction were puzzling. I expected higher culture strength would be linked with greater job satisfaction. The MSL data supported this expectation. But intensity wasn't correlated with job satisfaction and several measures (intensity numerator, core values, and desired behavior) were correlated negatively with job satisfaction. I expected culture gap (and its factors) to correlate negatively with job satisfaction using the logic that decreases in culture gaps

[35]Because the Shenandoah correlations were lower than those for MSL, I used a different legend for identifying significance. Four asterisks indicate significance at the .01 level for Shenandoah and at the .005 level for MSL. One asterisk indicates significance at the .20 level for Shenandoah and at the .10 level for MSL.

Table 27. The Spearman rank order correlation coefficients showed the first canonical variable as a good predictor of the criterion variables. The correlations also reveal a negative association with job satisfaction.

CS Measure	NCOM	ICOM	JOBSATIS	GROUP
Intensity	0.048	0.571*	0.024	-0.071
Intensity numerator	0.429	0.000	-0.714**	0.619*
Core values	0.571*	0.262	-0.738***	0.429
Cultural behavior	0.595*	-0.048	-0.524*	0.738***
Desired behavior	0.500	-0.071	-0.452	0.714**
Culture gap	-0.690**	-0.071	0.524*	-0.738***
Performance	-0.548*	0.048	0.500	-0.619*
People	-0.252	0.491	-0.084	-0.898****
Job	-0.762***	-0.714**	0.167	-0.119
Fit	0.095	0.500	0.429	-0.405
Effects	0.143	0.286	-0.405	0.024
First Canonical	0.333	-0.333	-0.071	0.952****
Second Canonical	0.595*	0.762***	0.214	-0.143

*p<.20, **p<.10, ***p<.05, ****p<.01, all two-tailed

Note: CS Measure=culture strength measure, NCOM=normative commitment, ICOM=instrumental commitment, JOB=job satisfaction, GROUP=group cohesion.

would be linked with increases in job satisfaction. The Shenandoah data showed just the opposite—positive correlations between job satisfaction and culture gap. The correlations with the culture gap *factors* were insignificant.

The first canonical variable was a very good predictor of group cohesion, but had no significant correlations with the other three criterion variables. However, the second canonical variable had significant correlations with both normative commitment and instrumental commitment. The correlations with job satisfaction were insignificant for both canonical variables.

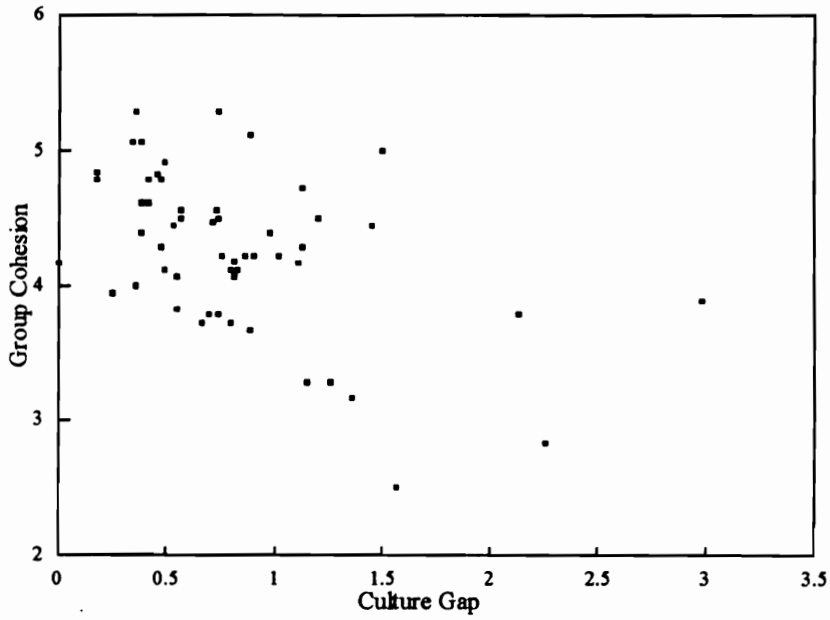

Figure 11. Culture gap consistently had a negative correlation with group cohesion.

This culture strength-job satisfaction finding was systematic within the two field studies reported here. For MSL, the culture strength measures were positively correlated with job satisfaction except for culture gap (which I would expect to be negatively correlated) and intensity. I expected the negative correlation between culture strength measures and intensity based on the intensity-core values matrix which suggested higher intensity would be associated with work groups having lower criterion measures. For Shenandoah, the correlations of job satisfaction with all culture strength measures were essentially the reverse—correlations with culture gap factors were positive and the correlations with the rest of the culture strength measures (including intensity) were negative. The signs for Shenandoah were just the opposite of what I would expect.

The use of a small sample size to calculate these correlations meant minor discrepancies in the data could cause great swings in the correlation coefficient. Also,

even the best nonparametric statistics usually have power at best equal to the parametric equivalent. More often, the nonparametric test has less power to detect trends or differences. The nonparametric tests often use rankings instead of the actual data; therefore we lose some of the richness of the original data when using nonparametric statistics. However, nonparametric statistics provide an option for a systematic analysis of the division-level data.

I examined the job satisfaction scores, the intensity scores, and the core values scores more carefully. Of the three divisions with the lowest job satisfaction scores (V, X, and S), V and S had the highest core values scores and the highest intensity numerator scores, V had the second highest intensity score, V had the highest and S had the third highest desired behavior score, and S had the lowest culture gap and V had the third lowest culture gap. The canonical variables should be the best predictors of the criterion variables. The fact that these correlations were insignificant reflects the general nature of the relationship between the culture strength measures and job satisfaction. The canonical correlation accounted for 43.93% of the variance in the criterion variables, so there's still room for other unmeasured variables to affect job satisfaction. By comparison, the MSL canonical correlation accounted for 73.1% of variance in the criterion variables. The effect of unmeasured variables combined with the small sample size used in the Spearman correlation could drastically change the nature of culture strength-criterion variable relationships.

I decided to investigate the culture strength-job satisfaction correlations a different way. I suspected the division-level analysis would differ from the analysis conducted using individual responses. I therefore calculated bivariate correlations between six culture strength measures for which I had individual-level data (core values, desired behavior, cultural behavior, and the culture gap factors of performance, people, job, and

fit) and job satisfaction. Table 28 shows all these correlations were highly significant *and in the expected direction*[36]. These findings suggested a systematic influence was operating at the division level to reverse the relationship between culture strength and job satisfaction. Further research should be undertaken to identify and understand the division-level influences causing these reversals. The response patterns of the V and S divisions (discussed earlier) are potential clues to this reversal phenomenon. Perhaps the use of a multiple-item scale to measure job satisfaction would eliminate this problem. I've noted this improvement in my suggestions for future research.

The job satisfaction findings are indeed puzzling. I save the exercise of further investigating the reversal phenomenon for future research.

The group cohesion scale was significantly correlated with many of the culture strength measures, including the intensity numerator, desired behavior, culture gap, the people factor of culture gap, and the first canonical variable. The strongest correlation (-0.898) occurred between the people factor and group cohesion. This means as the culture becomes more supportive, tolerant, fair, people-oriented, and team-oriented, and as more information is shared freely[37], the division should also experience greater group cohesion. (Remember I'm reporting measures of association and not measures of causality.) The number and level of significance of these correlations involving group cohesion and culture strength measures, both for Shenandoah and for MSL, supported the belief of group processes playing an integral role in culture management.

The job factor shed some insight into the two commitment scales. The job factor was negatively correlated with both the normative and instrumental commitment scales. I expected the negative correlation with normative commitment, because I expected an

[36]By expected direction, I mean positive for culture strength measures and negative for culture gap factors.
[37]See Table 7 for the full list of items loading on the people factor.

Table 28. Bivariate correlations between culture strength measures and job satisfaction conducted on the individual level data produced significant correlations in the expected direction. (Core=core values measure, DB=desired behavior, PERF=performance factor, PPL=people factor, JOB=job factor, FIT=fit factor.)

Job sat	Core	DB	PERF	PPL	JOB	FIT
corr	0.406	0.324	-0.281	-0.410	-0.323	-0.175
p	0.0001	0.0001	0.0002	0.0001	0.0001	0.0243

increase in value-based commitment as people perceived the existing values approaching the desired values with respect to items in the job factor (e.g., offering praise for good performance).

I did not expect the same relationship to hold for instrumental commitment until I considered the values in the job factor: high pay for good performance, security of employment, offering praise for good performance, and opportunities for professional growth. These values seemed in concept related to instrumental commitment because they reflect the economic and reward basis for being committed to the division. The Shenandoah data suggested closing the culture gap with respect to these job-related values would be accompanied by an increase in instrumental commitment. Given the values constituting the job factor, this relationship made sense intuitively. Typically, I would expect closing the culture gap to increase normative commitment and decrease instrumental commitment. My reasoning is the decrease in culture gap means people are more likely to commit on the basis of values and less likely to commit on the basis of economic exchanges. I suspected normative commitment and instrumental commitment operated somewhat independently, rather than when one commitment scale increased the other one decreased. Given the number of significant correlations between the culture strength measures and normative commitment (5 at p=.20 or better) compared to the one

significant correlation between a culture strength measure and instrumental commitment, the normative commitment measure showed evidence as a more relevant criterion measure for culture strength. The standardized canonical coefficients for the Shenandoah data supported this idea—the weight for normative commitment was 0.1115, whereas the weight for instrumental commitment was 0.0819. Although neither of these weights was high enough to be considered significant (i.e., greater than 0.40), with normative's weight slightly higher than that of instrumental, I can infer normative commitment is a slightly more relevant criterion measure for culture strength.

I calculated Spearman rank order correlations between the Shenandoah rankings and both sets of variables—the culture strength measures and the criterion variables. In general these correlations were insignificant. The only significant correlations emerging from this analysis were at the .20 level. These included a -0.561 correlation between the job factor and the second set of rankings, a 0.561 correlation between instrumental commitment and the second set of rankings, and a 0.548 correlation between the second canonical variable and the first set of rankings. The lack of significance between these rankings and culture strength measures and criterion variables could have been due to several reasons. First, the person performing the second set of rankings didn't differentiate among the middle three divisions. I therefore treated these as ties, and this affected the quality of the rankings since three of the eight rankings were the same. Second, clearer specifications could have been issued for Shenandoah management to perform these rankings. Managers could have been instructed to produce one set of rankings for each criterion variable rather than a composite ranking. I address this improvement later in my suggestions for future research.

7.5 Interpretation of Culture Strength Measurement at Shenandoah

The Shenandoah data produced different results than the MSL data. For MSL, the intensity-core values matrix provided management information regarding culture management. For Shenandoah, the intensity-core values matrix merely illustrated the dependency between the two measures.

The Spearman rank order correlations between culture strength measures and the criterion variables produced some results that were difficult to interpret. The finding on the Shenandoah data of negative correlations between culture strength measures and job satisfaction was most puzzling, though the bivariate correlation analysis helped pinpoint the problem to possible division-level influences acting to reverse the correlations. I use the next chapter as an opportunity to interpret the analyses of both field studies.

Chapter 8. Interpretation and Integration of the Field Study Results

8.1 Overview

Although the discussion of the field study results presented in Chapters 6 and 7 offered some interpretations along with the results of analysis, these interpretations were offered within the context of the particular field study. This chapter focuses on the interpretation of results given both field studies and, where appropriate, on the basis of the combined MSL and Shenandoah data sets.

This chapter is structured as follows. I review results obtained for the different types of analyses I conducted for the field studies. These analyses include scale reliability, factor analysis on the culture gap scale, canonical correlation between culture strength measures and the criterion variables, the intensity-core values matrix, and the Spearman rank order correlations between culture strength measures and criterion variables at the division level. I discuss the MSL results, the Shenandoah results, any combined results, and then offer an interpretation for the purpose of measuring culture strength in organizations. I then integrate these interpretations into an overall view of how culture strength should be measured in organizations and set the stage for future research on culture strength.

I include a section on the evidence I've gathered for the three groups of hypotheses presented in Chapter 4. These hypotheses were not formally tested because my research has been exploratory rather than confirmatory. These hypotheses did help drive the research. I also include a section on validity to summarize evidence I've gathered regarding the ability of the culture strength measures to actually measure culture strength. I also compare judges rankings of work groups[38] to their criterion measures of commitment, job satisfaction, and group cohesion.

8.2 Interpretation of Field Study Analyses

In this section, I review the results of field study analyses for MSL, Shenandoah, and combined analyses, where appropriate. I interpret the results for their implications in measuring culture strength in organizations.

8.2.1 Internal consistency

I checked each of the scales used for their reliability using a test of internal consistency. I used Cronbach's alpha to see if people responded to the scales in a consistent manner. If the scales had high reliabilities (i.e., were internally consistent), then I concluded I could proceed with my analyses.

I performed these analyses using the combined MSL and Shenandoah sample of 214 returned instruments. I checked reliability for the existing values items, the desired values

[38]In this chapter, I refer to the organizational units whose culture I studied as work groups. I referred to these organizational units as divisions for the Shenandoah field study in Chapter 7 but this was merely to differentiate from their use of work group which did not coincide with my use.

items, the cultural behavior scale, the effects scale, the commitment scales (both normative and instrumental commitment), and the group cohesion scale.

I computed the internal consistency of scales using both MSL data and the Shenandoah data. The scales included in these analyses were: the existing values scale, the desired values scale, the cultural behavior scale, the effects scale, the commitment scales (both normative and instrumental commitment), and the group cohesion scale. Job satisfaction was a single item scale and could not be analyzed for reliability. I found all scales had internal consistency above the commonly accepted threshold of 0.7 except for instrumental commitment (in both cases) and the effects scale (just in Shenandoah's case). I calculated internal consistency for the combined data set and found all scales above the 0.7 threshold except for instrumental commitment (Table 29).

These reliability data allowed me to interpret my results with confidence, except for those results involving instrumental commitment. I have been careful throughout this research to not place a great amount of emphasis on the instrumental commitment results. Instrumental commitment has not shown strong correlations either in the canonical analysis or in the Spearman rank order correlations. Therefore, I concluded the scales used are reliable and suitable for use in my research except for instrumental commitment. Because this is exploratory research, I retained instrumental commitment for the purpose of seeing whether effort should be spent on developing a better (i.e., more reliable) scale. Given the low levels of correlations involving instrumental commitment, I would focus on

Table 29. All scales except instrumental commitment showed sufficient evidence of their reliability. (Data shown are Cronbach's alphas for each scale.)

Existing	Desired	Behav	Effects	NCOM	ICOM	Group
0.9538	0.9401	0.9597	0.7121	0.8878	0.5760	0.9370

other research tasks in the future before tackling this one.

8.2.2 Factor analysis for the culture gap scale

As I noted in Chapter 6 on MSL, the culture gap scale had high correlations with the criterion variables, especially with group cohesion. Because the culture gap scale was composed of 53 items, I ran a factor analysis to see how the 53 items would group into factors. The culture gap scale was derived from responses to the existing values and the desired values. As such, the interpretation of its factors may differ from factors resulting directly from responses either the existing values scale or the desired values scale.

I chose factors having eigenvalues greater than 2.0 for the canonical correlation. I used different criteria to determine item loadings for MSL and Shenandoah. Because of MSL's small sample size and because of the many items loading on the factors, I considered only those items with loadings ≥ 0.55. For Shenandoah, where the sample size was closer to 200, I used all factors loading 0.40 or higher.

I identified three factors for MSL (accounting for 52.06% of variance) and four factors for Shenandoah (accounting for 48.17% of variance). Both MSL and Shenandoah had two similar factors—one called performance and another called job. Four items were common to the performance factors between the two organizations whereas two items were common to the job factor.

I ran a factor analysis on the combined data set (Table 30). This factor analysis was based on 214 responses. I used the same criteria for keeping factors (eigenvalue ≥ 2) and loading items (loading ≥ 0.40) as used for the Shenandoah data. The combined factor analysis resulted in four factors accounting for 46.85% of variance.

Table 30. The factors for the combined data set have factors similar to the Shenandoah results. (Factors are listed in order from highest loading to lowest loading. Percentages refer to the proportion of variance explained by each factor.)

Factor 1: **Performance1** **32.69%**	**Factor 2:** **People** **5.64%**
taking initiative (0.71) action-oriented (0.71) willing to experiment (0.71) innovative (0.71) opportunities (0.70) achievement-oriented (0.62) decisive (0.59) high performance (0.59) analytical (0.58) reflective (0.52) risk-taking (0.51) adaptability (0.50) aggressive (0.47) being demanding (0.45) ind responsibility (0.44) clear philosophy (0.42) flexibility (0.41)	being tolerant (0.69) being supportive (0.68) being calm (0.68) sharing information (0.67) people-oriented (0.64) team-oriented (0.59) one culture (0.56) individual rights (0.55) being fair (0.50) collaboration (0.48) being easy going (0.46)
Factor 3: **Job** **4.52%**	**Factor 4:** **Performance2** **4.00%**
high pay (0.80) praise for performance (0.78) secure employment (0.78) professional growth (0.76) confront conflict (0.47) enthusiasm for job (0.43)	social resp. (0.72) long hours (0.59) good reputation (0.56) results-oriented (0.55) emphasizing quality (0.45)

The factor analysis resulted in four factors: performance1, people, job, and performance2. Not surprisingly, the items loading onto the first three factors were very similar to those loading onto the first three factors for the Shenandoah data set. In fact, the performance1 factor contained 14 items from the corresponding Shenandoah factor, the people factor contained 10 items from the corresponding Shenandoah factor, and the job factor contained four items from the corresponding Shenandoah factor. Given the heavy weighting by the Shenandoah data (171 vs. 43 for MSL), I expected the combined

analysis to reflect the Shenandoah results. The fourth factor, performance2, was completely different from the fourth factor for Shenandoah (the fit factor).

8.2.3 Canonical correlation analysis

I used the four factors resulting from the combined factor analysis in a canonical correlation for the combined data set. As I've done for MSL and Shenandoah, I discuss both the first and second canonical variables because both were significant. The combined data set produced a canonical correlation of 0.716 ($p \leq 0.0001$) between the culture strength measures and the criterion variables. The second canonical variable had a canonical correlation of 0.285 ($p \leq 0.0261$). The combined data produced a canonical $R^2=0.5125$ for the first canonical variable and 0.0832 for the second canonical variable.

8.2.3.1 First canonical variable

The people factor was the only culture strength measure having a standardized canonical coefficient (SCC) greater than 0.40 and group cohesion was the only criterion variable with an SCC greater than 0.40. However, the interpretation of the people factor shows it subsumed the cultural behavior measure and the other three culture gap factors used in the analysis (performance1, performance2, and job). The group cohesion measure subsumed the normative commitment measure and the job satisfaction measure. This analysis resulted in a canonical $R^2=0.5125$, meaning (in the first canonical variable) the culture strength measures share 51.25% variance with the criterion variables.

This canonical correlation showed the relative weights for the culture strength measures and suggested the people factor and the cultural behavior measure were the strongest predictors of the criterion variables. The other four variables contributed to the ability to predict, but to a lesser extent. The combined data showed the effects scale with

a standardized canonical coefficient (SCC) very similar to the Shenandoah case (-0.0848). The combined analysis changed the criterion side of the analysis. Group cohesion had an SCC of about 1.0 and the other three measures had SCCs less than 0.10. However, an examination of the correlations with the canonical variable showed group cohesion subsumes normative commitment and job satisfaction to a great extent and instrumental commitment to a lesser extent.

I then built the equation for the canonical variable using the SCCs for the culture strength measures. Table 31 shows the standardized canonical coefficients. Table 32 shows the bivariate correlations between the culture strength measures and the criterion variables. Table 33 lists descriptive statistics for each scale used in the canonical correlation. The equation for the first canonical variable was (using the raw canonical coefficients): 0.3747(BEHAV) - 0.0848(EFFECTS) + 0.2201(PERF1) - 0.7820(PEOPLE) - 0.0357(JOB) - 0.1693(PERF2) = 0.0137(NCOM) + 0.0974(ICOM) + 0.0353(JOBSATIS) + 1.0015(GROUP). (BEHAV is the cultural behavior measure derived from the mean of all 53 behavior ratings. EFFECTS is the mean score from the effects score. PERF1, PEOPLE, JOB, and PERF2 are the top four culture gap factors. NCOM is normative commitment whereas ICOM is instrumental commitment. JOBSATIS is the faces scale for job satisfaction. Finally, GROUP is the group cohesion scale.)

I interpreted this first canonical correlation as follows. As the culture gaps decrease (i.e., existing values approach desired values) for the people factor and as the people's behavior increasingly reflects the surveyed values, this represents a stronger culture and this stronger culture is evidenced by the increase in the criterion variable of group cohesion. The group cohesion measure subsumed normative commitment and job satisfaction.

Table 31. Cultural behavior and the people factor were the best predictors of the criterion variables in the combined data set.

Culture Strength Measures			Criterion Variables		
Variable	**Coefficient**	**r**	**Variable**	**Coefficient**	**r**
BEHAV	0.3747	0.71	NCOM	0.0137	0.72
EFFECTS	-0.0848	-0.20	ICOM	0.0974	-0.27
PERF1	0.2201	-0.67	JOBSATIS	0.0353	0.56
PEOPLE	-0.7820	-0.93	GROUP	1.0015	1.00
JOB	-0.0357	-0.61			
PERF2	-0.1693	-0.67			

Note: The statistic r denotes the correlation of the variable with the canonical variable. ($\lambda = 0.4248$, $p < 0.0001$, $R^2 = 0.5125$)

Table 32. Bivariate correlations between culture strength measures and the criterion variables provided a benchmark for the canonical correlation results.

	NCOM	ICOM	JOBSATIS	GROUP
BEHAV	0.3958	-0.1850	0.2870	0.5096
EFFECTS	-0.1254	0.0134	0.0659	-0.1439
PERF1	-0.4060	0.1674	-0.2923	-0.4759
PEOPLE	-0.4783	0.1836	-0.3897	-0.6638
JOB	-0.4300	0.1928	-0.3381	-0.4391
PERF2	-0.3392	0.0677	-0.2820	-0.4697

Table 33. Descriptive statistics provided a basis for the variables used in the canonical correlation.

Variable	Mean	Std. Dev.
BEHAV	70.3031	16.4127
EFFECTS	3.4877	0.5443
PERF1	0.9343	0.6898
PEOPLE	1.0067	0.8587
JOB	1.6293	1.0639
PERF2	0.7956	0.6835
NCOM	4.0674	0.9287
ICOM	2.7776	0.7953
JOBSATIS	7.5561	2.3206
GROUP	4.1793	0.7795

8.2.3.2 Second canonical variable

The second canonical correlation was 0.2885 (p=0.0261). This second canonical variable showed all four culture gap factors having high weights relative to the other culture strength measures. On the criterion variable side of the equation, normative commitment, instrumental commitment, and group cohesion had high standardized weights (-1.1101, 0.5954, and 1.0813, respectively). Normative commitment and instrumental commitment had much higher weights than in the first canonical.

The signs on the weights showed as the gap in job-related values (as defined by the job factor) decreased, group cohesion decreased. This relationship implied a reduction in culture gap should be accompanied by lower group cohesion. Normative commitment had a positive weight and it increased as the culture gap factors of job and performance1 decreased.

The job factor had the highest weight (0.9942). The interpretation of the four culture gap factors showed they didn't subsume either the cultural behavior measure or the effects measure. On the criterion side, job satisfaction showed a -0.3482 correlation with the second canonical variable and was therefore partially subsumed by normative commitment and group cohesion. This analysis resulted in a canonical R^2=0.0832.

This second canonical correlation suggested all four culture gap factors were the strongest predictors of the criterion variables. Cultural behavior and the effects scale didn't illustrate evidence of predictive potential regarding the criterion variables.

I then built the equation for the second canonical variable using the SCCs for the culture strength measures. (See Table 34.) The equation for the second canonical variable was (using the raw canonical coefficients): 0.0201(BEHAV) - 0.0618(EFFECTS) + 0.8309(PERF1) - 0.6664(PEOPLE) + 0.9942(JOB) -

0.7700(PERF2) = -1.1011(NCOM) + 0.5954(ICOM) - 0.2128(JOBSATIS) + 1.0813(GROUP). (BEHAV is the cultural behavior measure derived from the mean of all 53 behavior ratings. EFFECTS is the mean score from the effects score. PERF1, PEOPLE, JOB, and PERF2 are the top four culture gap factors. NCOM is normative commitment whereas ICOM is instrumental commitment. JOBSATIS is the faces scale for job satisfaction. Finally, GROUP is the group cohesion scale.)

I interpreted this second canonical correlation as follows. As the people and performance2 factors increased and as the performance1 and job factors decreased, normative commitment increased and instrumental commitment decreased. As people indicated higher agreement with values such as high pay for good performance, security of employment, and opportunities for professional growth, instrumental commitment increased whereas normative commitment decreased. Under the second canonical correlation, a stronger culture results when the culture gaps for performance1 and job factors are small and the culture gaps for people and performance2 are large. The

Table 34. All four culture gap factors had high weights under the second canonical variable, although they had alternating signs.

Culture Strength Measures			Criterion Variables		
Variable	**Coefficient**	**r**	**Variable**	**Coefficient**	**r**
BEHAV	0.0201	-0.20	NCOM	-1.1011	-0.59
EFFECTS	-0.0618	-0.08	ICOM	0.5954	0.53
PERF1	0.8309	0.33	JOBSATIS	0.2128	-0.35
PEOPLE	-0.6664	0.00	GROUP	1.0813	-0.03
JOB	0.9942	0.64			
PERF2	-0.7700	-0.12			

Note: The statistic r denotes the correlation of the variable with the canonical variable. ($\lambda = 0.8713$, $p < 0.0261$, $R^2 = 0.0832$)

normative commitment measure subsumed the instrumental commitment and job satisfaction measures.

8.2.4 Intensity and core values measures

The intensity and core values measures provided a more personal view of the cultures under investigation. Rather than merely being numerical measures, the intensity and core values measures identified a set of values for the organization (the core values) and the division or work group (values constituting intensity). As I mentioned in Chapter 6, the intensity values for MSL groups were so illuminating I was able to identify several of the work groups just by looking at their top values. The core values for both MSL and Shenandoah had face validity from knowledge of their day-to-day operations. The core values for both also had concurrent validity because many of the core values were found in management planning documents. However, these planning documents typically addressed desired values more than existing values.

I discussed the intensity-core values matrix extensively in the field study chapters. The two field studies produced different results for each application of the matrix. For MSL, the matrix seemed to provide a method for predicting work group criterion measures on the basis of intensity and core values measures. For Shenandoah, the matrix merely illustrated the high level of dependence between the two measures. This dependence, if existent, was an inverse relationship between intensity and core values. Perhaps the predictive finding between the matrix quadrants and criterion measures would hold if intensity and core values had an inverse relationship and wouldn't hold otherwise. This notion could be tested once I have collected data from many different organizations.

The value of "emphasizing quality" appeared in most value listings. I suspected this occurred partially because people's awareness has been raised by their management. Add to this the business press, the many training seminars, and the volume of marketing materials received in one's in-box. I suspected quality was also rated highly because people genuinely believe a quality emphasis is important to their cultures. Quality is a broad concept. I suspect quality subsumes many other performance-related values the same way I would expect for a concept such as "excellence." However, I believe the other 52 values used in my scales offered ample opportunity to capture specific values operating within the studied cultures.

The core values measures showed how closely the work groups hold the organization's top values. For both MSL and Shenandoah, I found the work groups working the closest with the chief executive had the highest core values measures. Keep in mind the core values were generated from data collected throughout the organization and were not necessarily those of top management. The groups working closest with the chief executive tended to be staff positions and these groups tended to have fewer members than those groups considered "line." Core values were derived from responses to existing values, not from desired values. Given all this, I found it fascinating that those groups working closely with the chief executive had the highest core values measures. This finding potentially suggested the groups working closest with the chief executive (proximal groups) are emulated by the rest of the organization (distal groups). This drive to emulate these proximal groups pushes the distal group values closer to those of the proximal groups. Attempting to capture proximal group values in the distal groups presented a converging force on the proximal group values and could result in proximal groups having high core values measures. This logic could be tested when I have collected data from many organizations.

8.2.5 Spearman rank order correlations

The Spearman rank order correlations provided measures of association between the culture strength measures and the criterion variables at the work-group level. Because these correlations were calculated at the work-group level, the combined data set wouldn't add anything to the analysis and interpretation—it would merely produce a data set with 16 work groups (eight each for MSL and Shenandoah) and result in one large table containing the same data in both of the field study tables. The differences in the intensity and intensity numerator measures were evident between the MSL and the Shenandoah correlations. For MSL, both intensity measures were significantly correlated ($p<.005$) with several of the criterion measures. For Shenandoah, only the intensity numerator was significantly correlated with job satisfaction ($p<.10$) and group cohesion ($p<.20$).

In both cases, the group cohesion measure was correlated significantly with many of the culture strength measures. Although not shown as a reliable scale, instrumental commitment produced negative correlations with culture strength measures (positive with culture gap measures); this is what I would expect. For the most part, the culture gap measures had correlations opposite in sign to the other culture strength measures. I expected this because as the culture gap increases, the criterion variables would be expected to decrease. My assumption is a stronger culture produces positive outcomes on the criterion variables and that translates into higher normative commitment, lower instrumental commitment, higher job satisfaction, and higher group cohesion.

In Chapter 7 (Shenandoah), I discussed the sign reversal phenomenon on the job satisfaction correlations when comparing division-level data with individual-level data. I was encouraged by the magnitude, direction, and significance of the simple correlations between job satisfaction and the culture strength measures, but I should not let my

expectations narrow my vision to exclude unexpected findings. I concluded in Chapter 7 that division-level influences were at work in the sign reversal. The systematic nature of the sign reversal suggested additional research should provide one or more reasonable explanations. If the sign reversals weren't systematic, I would hold less hope that additional research would find a reasonable explanation.

8.2.6 Commitment and intrinsic/extrinsic motivation

My research suggested a link between the normative/instrumental commitment measures and intrinsic/extrinsic motivation. I used O'Reilly and Chatman's (1986) 12-item scale to measure commitment. The scale has two dimensions—normative commitment and instrumental commitment. Normative commitment is based on acceptance of the work group values whereas instrumental commitment is based on exchange of labor for rewards. Normative commitment is therefore more closely linked to intrinsic motivation through the acceptance of work group values and the effects on individual and work group behavior. Instrumental commitment is more closely linked to extrinsic motivation because of the role of "rewards" in motivating performance. When discussing motivation, I should refer to reinforcers or reinforcement of behavior rather than rewards for people. If we view instrumental commitment as based on labor exchanged for reinforcement, specific behaviors performed while providing labor are reinforced (or punished) either positively or negatively. I introduced these links to provide the rationale for at least viewing the commitment scales in terms of motivation theory—normative commitment can be viewed as a construct related to intrinsic motivation whereas instrumental commitment can be viewed as a construct related to extrinsic motivation.

Higher normative commitment scores would suggest greater internalization of the work group values whereas higher instrumental commitment scores would suggest compliance with work group and organizational rules, policies, and procedures. These measures (normative commitment and instrumental commitment) correspond with O'Reilly and Chatman's (1986) stages of commitment: compliance, identification, and internalization. Work groups where employees act out of compliance would tend to have high instrumental commitment and low normative commitment. Work groups where employees act because they have internalized the work group values would tend to have high normative commitment and low instrumental commitment. Work groups at the identification stage of commitment would tend to score in the middle of both normative commitment and instrumental commitment—their behavior is driven by their association with the work group and/or the organization and it's based on a combination of commitment to values and material rewards. I've introduced these stages of commitment to help in generating hypotheses for future research.

The canonical variables should theoretically be the best predictors of the criterion variables and therefore have the highest correlations across all the criterion variables. For MSL, the canonical variable was a good predictor but by no means the best. For Shenandoah, the first canonical variable had the highest correlation in the table (0.952), yet this was its only significant correlation. For Shenandoah, the culture gap factor was significantly correlated with normative commitment, job satisfaction, and group cohesion and appeared as the best predictor among those tested. The more detailed correlations produced by relating culture gap factors with criterion variables provided good information that could be lost when aggregating them into a canonical variable.

8.3 Integrating these Interpretations

Integrating the results and the interpretation of those results for MSL, Shenandoah, and the combined analyses provided guidance for measuring culture strength in organizations. I faced one particular difficulty when integrating the results of culture strength measurements. Several of the measures could be calculated for each individual and therefore used in the canonical correlation analysis. A measure's inclusion in the canonical correlation meant the measure would receive a standardized coefficient for comparison with the other measures in the canonical correlation. Yet other measures (intensity, desired behavior, and core values) required aggregate data to calculate them[39]. Therefore, in drawing conclusions about the best measures of culture strength, I relied on the results of two different types of analyses. I didn't discard any of the measures on the basis of only two organizations. However, I needed to work with those measures consistently not showing evidence of the ability to predict the criterion variables to try to improve their measurement ability.

8.3.1 The canonical correlations

I first discuss the implications of the canonical correlations on culture strength measurement. I included the culture strength measures of cultural behavior, effects, and the culture gap factors having eigenvalues 2.0 or higher. My early analyses on the MSL data (prior to conducting factor analyses on the culture gap scale) showed high correlations between culture gap and the criterion variables, especially group cohesion.

[39]Since the core values measures were calculated using organization-wide data, I decided to calculate core values measures at the individual level and then use the core values measures in the canonical correlation. This isn't the most rigorous procedure, but at least I obtained an indication of the impact of the inclusion of the core values measures in the canonical correlation. However, in this interpretation chapter, I treated the core values measures as an aggregate measure not used in the canonical correlation because using core values across organizations would not make sense.

This led to my performing a factor analysis on the culture gap scale. I then used the factors in the canonical correlation to obtain more detailed information about the relationships between culture gap and the criterion variables. Cultural behavior was consistently a good predictor of the criterion variables, with standardized canonical coefficients (SCC) of 0.4686, 0.3801, and 0.3747, respectively for MSL, Shenandoah, and the combined analysis. The effects scale did not show evidence of being an effective measure of culture strength as based on its ability to predict the criterion variables. The SCCs for the effects scale were approximately 0.08 for each of the three cases. An analysis of the effects scale's correlation with the canonical variable did not show significance. Although the effects scale did not appear as a good predictor of the criterion variables, I believe the underlying theory of the work group's ability to withstand external force still holds as an operational definition of culture strength. A better method for measuring this ability should be developed and integrated into the next field study measurement.

The composition (in terms of item loading and factors kept in the analysis) of the culture gap factors varied from MSL to Shenandoah, but the Shenandoah factors were very similar to those for the combined set. For all three set of analyses, at least one of the culture gap factors had an SCC greater than 0.40. In fact, the factors with the highest SCCs had weights of -0.4381 (MSL-performance factor), -0.8895 (Shenandoah-people factor), and -0.7820 (combined-people factor). I concluded the culture gap scale was a very important measure of culture strength. Breaking culture strength into its factors helped further maximize the relationship between the culture strength measures and the criterion variables. With the people factor exhibiting such high weights, I concluded the values loading on the people factor were critical to culture management at Shenandoah and to the measurement of culture strength at Shenandoah. The MSL data did not

produce a people factor in its top factors. Only the addition of data from other organizations would help in concluding whether a set of culture gap factors exists in general. I suspect culture gap factors are unique to organizations or classes of organizations and I'll therefore retain all 53 values used in the culture gap analysis (although I'll probably modify, add, and delete values items in an effort to improve the scale).

On the flip side of the canonical equation, the group cohesion scale had by far the highest correlations. The other three criterion variables—normative commitment, instrumental commitment, and job satisfaction—proved more useful in the second canonical variables. These three variables, however, were often subsumed by group cohesion when analyzing correlations of the criterion variables with the canonical variable. Normative commitment consistently had high weights for the second canonical variable.

8.3.2 The aggregate measures and Spearman correlations

I discussed intensity, core values, and the Spearman correlations earlier. Here, I wish to draw conclusions regarding the usefulness of these measures (including the desired behavior measure). I acknowledge the intensity ratio and intensity numerator behave differently for different organizations, but I suggested earlier potential relationships concerning work group criterion measures that may hold if intensity and core values are inversely related. Testing these relationships will require data from additional organizations. Whereas the results of using the intensity measures are mixed, I recommend retaining the intensity measures to allow further testing of their effectiveness and role in differentiating organizations and in measuring culture strength.

The core values measures had significant correlations with the criterion variables, yet were correlated significantly with different criterion variables for MSL compared to Shenandoah. Combined with the earlier linkage of core values with work groups working closely with the organization's chief executive, the Spearman correlations concerning core values suggested the core values measures were good predictors of the criterion variables and therefore good measures of culture strength.

Although the canonical correlation could only use culture strength measures calculable by individual, the Spearman analysis is amenable to all the culture strength variables. My focus in using the Spearman correlations was to investigate the aggregate culture strength measures. I considered the canonical correlation a more powerful procedure by virtue of its being based on parametric statistics whereas the Spearman correlations are nonparametric. The Spearman correlations provided additional evidence for the measurement effectiveness of cultural behavior, culture gap (and its factors), the effects scale, and the canonical variables. Cultural behavior and culture gap, both appearing as good predictors of the criterion variables in the canonical correlation, were also good predictors using the Spearman correlations. The Spearman correlations did not show the effects scale significantly correlated with any of the criterion variables

The canonical variables, by definition, should be the best predictors of the criterion variables. However, aggregating the canonical variables by work group may affect this predictive ability. For MSL, the canonical variable was the best predictor across all criterion variables. For Shenandoah, the canonical variable was a good predictor across all criterion variables, although cultural behavior was equally as good and culture gap was slightly better, in terms of correlation magnitude (and therefore significance). When interpreting the canonical variable's correlation with the criterion variables, keep in mind the canonical variable was constructed from the effects scale, cultural behavior, and the

culture gap factors. Intensity and core values could not be included in the canonical correlation and are therefore not part of the canonical variable. At this stage of the research, I must still consider the two basic types of culture strength measures (those used in the canonical correlation and all the rest) when deciding on the best way to measure culture strength.

8.4 Evidence Gathered on the Hypotheses

I formulated hypotheses in Chapter 4 to guide my research. I expect this exploratory work to neither confirm nor disconfirm these hypotheses. My research procedure began accumulating evidence to support (or not support) the hypotheses. I treat these hypotheses in terms of the general relationship being suggested (i.e., between culture strength and each of the criterion variables) and don't intend at this point to analyze each of the 20 hypotheses separately. This section merely serves to summarize findings presented in this document and to form an element of closure on the hypotheses. Hypotheses presented early and then abandoned later is not a good research practice. This is exploratory research and not confirmatory research. Therefore, I neither accept nor reject these hypotheses. I merely offer my judgment regarding the plausibility of the relationships posed in the hypotheses. I used these hypotheses to drive my research and to help in the interpretation of findings (what I would expect).

The Spearman rank order correlations were conducted on work group data and the results of these correlations speak directly to my hypotheses. The canonical correlation analysis offered organization-level results and therefore those results addressed the culture strength measures in general, regardless of work group affiliation. However, when the

Spearman correlations were supported by the canonical correlation findings, I perceived the hypothesized relationship as having greater plausibility.

8.4.1 H1: Work groups with high culture strength have higher normative commitment than work groups with low culture strength.

This hypothesis was supported by the intensity measure for MSL, and the core values measures, cultural behavior measure, and culture gap measures (and several factors) for Shenandoah. This hypothesis was supported by the canonical variable in both cases. Shenandoah's canonical correlation also supported this hypothesis.

8.4.2 H2: Work groups with high culture strength have lower instrumental commitment than work groups with low culture strength.

I can test this hypothesis once the instrumental commitment scale reliability increases. At 0.5760, I wouldn't have as much confidence in the relationships and correlations involving instrumental commitment as I did with relationships involving scales with higher reliabilities. I included instrumental commitment in my analyses and generally found no significance. Where I found significance, the data showed support for this hypothesis because these correlations were negative.

8.4.3 H3: Work groups with high culture strength have higher job satisfaction than work groups with low culture strength.

I found mixed and puzzling findings concerning this hypothesis. In general, the canonical correlation analyses resulted in low weights for job satisfaction, although job satisfaction was often subsumed by group cohesion and normative commitment. The

Spearman correlations for MSL suggested higher culture strength was significantly associated with higher job satisfaction. However, the Spearman correlations for Shenandoah were consistently the opposite. Even Shenandoah's canonical variable had a significant negative correlation with job satisfaction. I discussed this sign reversal phenomenon in some detail in Chapter 7. For now, the only good evidence I have for this hypothesis is incongruent. Future research should investigate this finding in some depth.

8.4.4 H4: Work groups with high culture strength have higher group cohesion than work groups with low culture strength.

This hypothesis received the strongest support. Both the canonical correlation weights (many above 1.0) and the Spearman correlations (many above 0.7) supported the hypothesis of high culture strength being associated with high group cohesion. The many significant findings between culture strength measures and group cohesion suggested other group measures may be useful as criterion variables in future culture strength research. The consistency of the relationships between the culture strength measures and group cohesion, even under different methods, presented a very strong case for a confirmatory finding from this research. However, my work is exploratory and I save the exercise of formal hypothesis testing for future research where many hypotheses are tested as a group and where the goal is confirmatory research.

8.5 Evidence for Validity

Throughout this document, I discussed various types of validity as applicable. In this section I've summarized the evidence presented throughout this document regarding the

concurrent validity of the scales used, the results of measurement (another form of concurrent validity), face validity, and content validity.

The instrument for measuring culture strength was composed of several scales. The scales for the criterion measures were taken from the literature. O'Reilly and Chatman reported their commitment scales yielded two factors (normative and instrumental commitment) in a principal components analysis. Wheeless et al. (1982) reported their group cohesion scale was unidimensional based on a factor analysis using those items loading 0.40 or higher. Brief and Roberson (1989) reported the Faces Scale was the most balanced of the job satisfaction scales they investigated (Minnesota Satisfaction Questionnaire [MSQ] or the Job Descriptive Index [JDI]) because the Faces Scale captured all three attitude components (positive affect, negative affect, and job cognition), whereas the MSQ captured only one, and the JDI, two.

I used the values from O'Reilly's OCP instrument. O'Reilly developed the set of 54 values using several field tests with graduate students. He started with a set of 110 values. He tested the values using four criteria. These criteria were 1) generality—relevance to many different types of organizations, regardless of industry or size; 2) discriminability—no single item should be in the same category for all organizations; 3) readability—the items should be easily understandable to facilitate commonly shared meanings; and 4) nonredundancy—the items should be distinct enough so they can't be substituted for each other consistently.

The criterion measures employed different types of response sets. The Faces Scale used a set of 11 characterized faces (or icons as some of my respondents called them) whereas the group cohesion scale and the commitment scales used agree/disagree response sets. The canonical correlation and the Spearman rank order correlations both

showed these criterion measures behaving somewhat consistently with respect to the culture strength measures. My finding of these criterion measures having different response sets and measuring different criteria yet behaving consistently (in statistical terms) is evidence of concurrent validity.

I noted in Chapter 6 on the MSL field study how my *a priori* expectations regarding the work groups were supported by my findings on culture strength measures and criterion measures. The match between my expectations and those measures provided evidence for concurrent validity. I obtained rankings of the Shenandoah divisions and analyzed these with respect to their culture strength measures and the criterion measures. These comparisons between the Shenandoah rankings and the results of analysis weren't as clean as those for MSL, yet I was able to discern some patterns (e.g., between the canonical variable and the criterion variables). Although not as strong as the MSL data, the Shenandoah data did provide some evidence for concurrent validity. Over time, I can test for predictive validity by comparing the culture strength measures to future events, outcomes, and performance.

My pre-testing of the instrument added evidence for face validity. Pre-test participants stated they felt the instrument measured culture strength. I substantially revised the effects scale prior to organization-wide administration of the instrument, based on their comments. Face validity alone was not a powerful form of validity as evidenced by its inability to find fault with the revised effects scale.

Several "judges" involved with my research agreed with the use of the instrument (and hence its scales) to measure culture strength. This provided evidence of construct validity—the instrument measured what people believe is culture strength.

I also obtained evidence for convergent and discriminant validity. O'Reilly et al. (1991) identified two scales in their commitment measure. These scales were normative commitment and instrumental commitment. My research showed these two scales discriminated highly from each other—often the correlations involving these two scales were opposite in sign. Normative commitment tended to correlate positively whereas instrumental commitment tended to correlate negatively with increased culture strength measures (and decreased culture gap). Normative commitment correlated negatively with instrumental commitment.

I correlated the culture strength measures (used in the canonical correlation for Shenandoah) among themselves and found core values (using a six-point Likert-type scale) and cultural behavior (using a percentage scale) moderately correlated (0.5915). Core values had correlations ranging from -0.3334 to -0.5480 for the four culture gap factors used in the Shenandoah case. Cultural behavior had correlations ranging from -0.3756 to -0.4471 for the four culture gap factors used in the Shenandoah case. These conclusions suggested concurrent validity because their correlations indicate the culture strength measures tapped the same construct.

8.6 Recommendations for Measuring Culture Strength

My recommendations for measuring culture strength focus on which culture strength measures to use. The process for measuring culture strength is contained in the relevant sections of this document and will not be repeated here.

8.6.1 Use factors derived from the culture gap scale.

The culture gap measure appeared as a powerful predictor of the criterion variables in both the canonical correlation and the Spearman correlation. Breaking the 53-item scale into factors helped identify what value sets are linked with the criterion variables. The items (values) loading onto these factors have management implications. If the gaps in these values are significantly correlated with the criterion variables such that decreases in the culture gaps result in increases in the criterion variables, then management interventions to close gaps in these factors should be accompanied by increased normative commitment, increased job satisfaction, and/or increased group cohesion. Keep in mind these culture gap-criterion variable relationships are associative and not causal.

8.6.2 Use the cultural behavior measure.

The cultural behavior measure was a mean of all ratings of the percentage of people whose behavior reflects each of the 53 values contained in the existing values scale. This measure has no adjustment for which of the 53 values are most suitable to the organization or work group. The general nature of the 53 values is positive, such that most organizations or work groups would desire holding these values. (Still, people differentiated among these values so I was able to determine those values having the highest extent of agreement.) As the cultural behavior measure increased, meaning more people's behavior reflected the listed values, the criterion variables tended to increase, too. This finding also held for the Spearman correlations. The cultural behavior measure was a good predictor of the criterion variables.

8.6.3 Use the canonical variable.

The canonical variable encapsulates the culture strength measures used in the canonical correlation. Therefore, the canonical variable should act as a composite of cultural behavior and the culture gap factors used in the canonical correlation. The intensity, core values, and desired behavior measures were not included in the canonical variable and should be considered along with the variables used in the canonical correlation when measuring culture strength. The canonical variable represents the closest approximation to a numerical score for culture strength, although it doesn't represent the intensity, core values, and desired behavior measures.

8.6.4 Use the core values measures by work group.

The core values measures not only had the ability to pluck out those values held tightly by the overall organization, but the core values measures also correlated highly with several of the criterion variables when using the Spearman rank order correlations. The specific correlations weren't consistent between the two field studies in my research, but in general the correlations with those criterion variables were frequently significant. The frequency of this significance suggests the core values measures are good predictors of the criterion variables, although further research is needed to understand how these measures vary from organization to organization.

8.6.5 Plot the intensity-core values matrix for work groups.

The intensity-core values matrix provided differing results for both field studies in this research. However, the face validity of the data in the MSL matrix suggested potential for using the matrix successfully with other organizations. As I discussed, the matrix was not very useful for the Shenandoah data. I hypothesized the matrix may have its greatest

value when intensity and core values are inversely related. Future research should demonstrate support for or against this hypothesis.

8.7 Summary

Throughout this document and this chapter I've discussed and explored many different ways to measure culture strength. I believe the recommendations presented above represent a beginning of a larger research stream. I've commented throughout this document on the need for data from other organizations. Only as I (and others) apply this measurement procedure to a variety of organizations in differing environments will a more general procedure evolve and emerge. However, I have also hinted that at least a portion of the culture strength measurement procedure will be specific to an organization. I'm referring here to the listings of values making up the intensity and core values measures. I don't expect a concise set of 10 values to exist in general for all organizations. Perhaps a class of organizations may hold some values in common but this is not my goal. I believe organizations and their work groups are unique clusterings of individuals bound together by common goals and experiences. Therefore, I expect organizations and work groups to manifest their uniqueness through value sets that are also unique.

I reached some general findings concerning culture strength measurement based on my experience with the two field studies. The canonical correlation provided some insight to culture strength measurement. Let me first suggest culture strength is represented by the canonical variable since the canonical variable encapsulates the culture strength measures used in the canonical correlation. Now, I can refer to the canonical variable as a composite measure of culture strength. I found stronger cultures tended to have higher

normative commitment and higher group cohesion. The instrumental commitment scale did not have sufficient reliability although it did have a 0.2794 weight in the MSL case meaning instrumental commitment tends to increase with higher culture strength. This instrumental commitment finding is suspect both because of the scale's relatively low reliability and because the corresponding weight for the larger Shenandoah sample was 0.0785. The other criterion variable, job satisfaction, had insignificant weights. So I now have two variables I believe are linked with culture strength—normative commitment and group cohesion, where group cohesion had weights 4-5 times those of normative commitment. But what drove the canonical variable?

I looked two places to find the relationship of the culture strength measures to the canonical variable. First, I examined the correlations of the culture strength measures with the canonical variable as output from the canonical correlation analysis. Second, I looked at the Spearman rank order correlation table. I found the canonical variable increased as the cultural behavior measure increased and as the culture gap factors decreased. These relationships were what I would expect, keeping in mind a decrease in culture gap suggested a stronger culture and hence a higher canonical variable. These findings were supported by both the canonical correlation analysis and the Spearman correlations.

The Spearman correlations also added other culture strength measures to the list of those variables changing concurrently with the canonical variable. The intensity and desired behavior measures weren't used in the canonical correlation and therefore I turned to the Spearman correlations to judge their effectiveness in measuring culture strength. I've discussed the differences between the two intensity measures and the behavior of those measures for MSL versus Shenandoah. The only finding consistent within the two cases was the intensity numerator-group cohesion's positive correlation. I therefore added the intensity numerator to the list of effective culture strength measures. The core values

measures were also significantly correlated in a positive direction with one or more of the criterion variables. I added the core values measures to the list. Desired behavior also had significant positive correlations with group cohesion for both cases.

In summary, several culture strength measures had significant correlations with either the canonical variable or with one or more criterion variables. I found the canonical variable increased (or the criterion variables increased) as: the culture gap measure decreased, the desired behavior measure increased, the intensity numerator measure increased, the core values increased, and the cultural behavior measure increased. ***Work groups with stronger cultures, then, have smaller gaps between their existing values and their desired values, have many people whose behavior reflects the desired values, have people whose behavior reflects many of the 53 values used in the survey instrument, have a small set of work group values held tightly by their people, and that small set of work group values closely mirrors the set of values held tightly by all members of the organization.***

The above interpretation represents the state of knowledge at the conclusion of this research. I don't expect that interpretation to remain the same; I expect it to be modified, qualified, and reshaped as new organizations are added to the data base and as the procedure is repeated on other organizations. This is exploratory research. I have confirmed only that this is the beginning of a new diagnostic procedure for identifying and understanding culture and culture strength in organizations. There is much work yet to be done. I look forward to the contributions of myself and others who take the challenge to make sense of such large and lofty concepts as culture and culture strength.

Chapter 9. Discussion and Suggestions for Future Research

9.1 Reviewing the Objectives of This Research

My research objectives were to a) operationally define culture strength, b) develop a procedure for measuring culture strength in organizations, c) and demonstrate the culture strength measurement procedure in one or more organizations. I used analogies from materials engineering and psychology to help conceptualize and operationally define culture strength.

9.1.1 Operationally define culture strength.

From materials engineering, I used the stress-strain diagram and the underlying relationship to inspire a force-effect relationship for culture strength. The force-effect relationship suggested an organization or work group has high culture strength if the organization or work group has the ability to withstand external forces. This is analogous to an engineering material being able to withstand stress with relatively low strain or deformation taking place.

I used the concept of core and peripheral traits from personality/psychology. I applied the core/peripheral theory to values and identified core values and peripheral values. Because the intensity measure carried a more useful terminology[40], I adopted that terminology instead of calling the top work group values "peripheral." This portion of the conceptual model formed the basis for several effective measures of culture strength—both in the statistical sense and in the derivation of top values for work groups, with those values having high face validity.

9.1.2 Develop a procedure for measuring culture strength.

I developed a procedure for measuring culture strength in organizations. I designed this procedure to account for subcultures and therefore tailored the procedure, measurement instrument, and analysis methods to focus on the work-group level of analysis. I built the instrument using modified versions of existing scales for measuring values, commitment, job satisfaction, and group cohesion. I developed a scale for measuring the force-effect relationship. I worked with a statistician/research methodologist and several pre-test groups to refine the instrument and my measurement procedure.

9.1.3 Demonstrate the measurement procedure in organizations.

I used the culture strength measurement procedure in two organizations—a large research organization at a major university and the headquarters organization of a regional provider of life insurance products and services. I conducted these two field studies sequentially, thereby allowing for improvements and changes between the two studies.

[40]The intensity measure is where the peripheral values are located. In working with managers and employees of work groups, I felt it was more appropriate to speak of the values making up their work group's intensity measure rather than refer to their top values as being "peripheral."

The modes of administration differed between the two field sites but the same types of data were captured. My ability to interpret the data differed dramatically. At the time of the survey I had over five years full-time experience with the first field site, whereas I had no previous experience with the second field site.

The measurement procedures administration and resultant analyses demonstrated the ability of the procedure and the instrument to capture data about the cultures of work groups and organizations. I used these data to reach conclusions on the effectiveness of various culture strength measures. In several places, my analyses suggested modifications of existing measures and portrayals involving more than one measure to gain additional insights to culture strength.

9.2 Implications of This Research

9.2.1 Theoretical implications

My operationalization of culture strength used the stress-strain relationship and the idea of core and peripheral traits. The core values measures displayed evidence of being effective measures of culture strength through the canonical correlation and through the Spearman rank order correlations by work group. Reviewing the core values for each of the field study organizations illustrated a form of face validity—the core values seemed to represent the values forming the basis for behavior in each of the organizations. A related measure, intensity, resulted in value sets for each work group. In several cases, these value sets were illuminating and provided an accurate picture of the work group—so accurate in cases that several people identified the work group solely on the basis on examining the value set.

I developed the effects scale to capture culture strength in a method analogous to the stress-strain relationship found in materials engineering. Although the effects scale was not found effective in this research, I believe this was due to scale design and not to the underlying theory. A comment made by a student at one of my interview seminars suggested culture strength maybe isn't the ability to withstand external forces but the ability to adapt to external forces. I can interpret adaptability using the stress-strain diagram. An adaptable material will retain its basic form and not "fail" or rupture. My effects scale accommodated the notion of adaptability in its response set. However, the effects scale should be redesigned to be more general and to be a more effective measure of the underlying conceptual relationship.

9.2.2 Practical implications

This research provided more useful data and information than I ever expected when embarking on the studies. To reduce a concept such as culture strength to an empirical and practical level required many iterations of concept and measurement until I felt I had a good procedure to take to an organization. With the culture strength measurement procedure reported in this document, the trained researcher can enter an organization, identify the organization's core values and the top values by work group. The method of collecting data about values allows the researcher to quantify the core values and top values by work group and to relate these measures to criterion variables. My procedure allows the researcher to characterize the gaps between the existing values and the desired values and to relate those gaps to commitment, job satisfaction, and group cohesion.

The culture gaps provide management information for interventions to close those gaps. For example, if a manager learns his division or work group has a large gap concerning job-related values, he or she can design interventions or introduce changes to

try to reduce that gap. Simple changes, such as offering praise for good performance, don't require planning or budgets; changes such as these require managers open to learning about their work group and willing to change and implement change to move the work group culture closer to its desired state.

My measurement procedure provides an opportunity for managers and employees to check their cultural assumptions and expectations against data from organizational members. The core values are useful whether or not they were expected to be core values. If people saw the core values and agreed with them or believed those values were representative of their organization, then the core values measures were useful in validating their perceptions. If people were surprised by the core values, then a different type of culture gap exists—this gap is between what one person thinks is the case and what the aggregate responses say the case is.

Work groups could be compared using several culture strength measures and criterion variables. Although these measures aren't definitive, they offer another method of characterizing work group cultures and setting up linkages with performance by relating work groups using culture strength measures and criterion variables. The goal is to understand and learn more about the linkages between culture strength and performance.

9.3 Limitations of This Research

This research was conducted on two relatively small service organizations. I therefore wouldn't expect my findings and conclusions to generalize much beyond these two organizations. In fact, several of my research findings (e.g., intensity) differed from MSL to Shenandoah. While a culture strength measurement procedure may one day

generalize to many organizations or classes of organizations, the current procedure is designed for use with organizations taken one at a time. This allows the researcher to begin to understand the context of the measurement and to get a feel for the data and results.

With only two organizations, I can only describe culture strength in relative terms and not in absolute terms. Thus, MSL may have a stronger culture than Shenandoah in terms of the canonical variable, but I don't know how MSL's canonical variable compares to the universe of canonical variables for all organizations or for a class of organizations. Until I have a larger data base of similar organizations, the determination of culture strength will rely more on relative measures than on absolute measures.

This research was conducted on service organizations employing knowledge workers. Employees of both organizations work with information as the primary content of their jobs and many hold college degrees (and advanced degrees, in the case of MSL). Therefore, I would not expect to be able to use the same survey instrument in a manufacturing plant employing skilled labor. I would want to tailor the instrument to that population and pre-test with representatives of that population before full-scale instrument administration.

Perhaps the most important limitation of this research comes in the interpretation of results for work groups. I designed this research to measure culture strength in organizations using the work group as the level of analysis. Although I assumed stronger cultures have advantages, such as higher performance, greater job satisfaction, higher commitment, and higher group cohesion, the results of the culture strength measurement procedure should not be used to describe work group cultures (or organizational cultures) as "good" or "bad." Each organization or work group is unique and has its own unique

circumstances and environment. The culture strength measurement procedure captures one element of the organization or work group. The results of measuring culture strength should be used to design effective interventions for improving the organization or work group. More importantly, the lack of external referents for these work group or organizational culture strength measures means referents internal to the organization will be used. Even if all the work groups in an organization had high culture strength, viewing these work groups against each other would show some with high culture strength and some with low culture strength. The procedure should form the basis for continuous improvement using cultural information. Even when external referents become available to compare culture strength measures, the emphasis should be on discovery, understanding, and improvement, not on blaming, comparing, and excuses (e.g., "Our culture is weak so our performance can never be good").

9.4 Suggestions for Future Research

I've identified several suggestions for improving the culture strength measurement procedure for use in further applications. These suggestions should drive the modifications to the culture strength measurement procedure and produce a better procedure and, hence, better results.

9.4.1 Investigate the relationship between culture strength measures and job satisfaction.

The peculiar finding of culture strength measures being correlated negatively with job satisfaction for Shenandoah and positively for MSL should be investigated carefully. With all the effort to promote strong cultures in organizations, researchers should try to

understand the systematic effects. If a stronger culture means lower job satisfaction, how many organizations would want strong cultures? The systematic nature of the correlation sign reversal suggests a well-planned research endeavor would surface a suitable explanation for this finding.

I used a single-item scale (the Faces Scale) to measure job satisfaction. I believe I could significantly improve the understanding of the job satisfaction construct in this research by replacing the Faces Scale with a multiple-item scale to measure job satisfaction.

9.4.2 Add different criterion variables to the analysis.

I used commitment, job satisfaction, and group cohesion as my criterion variables in this research. Many other criterion variables could be considered and used, such as intent to leave, other job satisfaction scales, and other measures of group processes. My research was constrained in time and therefore I collected data on criterion variables at the same time as collecting data on culture. If I measure culture at time 1 and the criterion variables at time 2, I could collect data relative to criterion variables requiring a time span, such as turnover, work group productivity, customer satisfaction measures, and number of innovations introduced.

I could also consider criterion variables to add to the work group-level analysis using rank order correlations. For example, work group measures of productivity, quality, and other performance measures could be correlated with culture strength measures. These correlations should be interpreted carefully. The researcher or manager shouldn't assume a high positive correlation between a culture strength measure and a performance measure means the culture of that work group is causing that result. The researcher or manager

should look to those work groups with high correlations for what can be learned about the cultures of those work groups potentially giving rise to higher performance. Certainly a review of the values making up the work group's intensity measure should be conducted and those values should be compared to other work groups within the organization. More powerful analyses (e.g., canonical correlation, regression) leading to the estimate of variance explained in the performance measures by the culture strength measures would add to the ability to manage culture for improvement. The problem using these more powerful analyses is they would require individual level measures of performance we'd be interested in at the organization or work group level (such as quality and productivity). These may be difficult or impossible to accurately measure at the individual level.

9.4.3 Develop a better effects scale.

As I discussed in several places of this document, the effects scale was not a good predictor of culture strength, although I believe the underlying concept of force and effect is essential to the understanding of culture strength. A scale is needed having greater relevance to respondents while being general enough to be used in many organizations. The response set should be unidimensional and have sufficient responses to help produce a good spread in the data. To the extent possible, the items in the response set should all be equally as likely to be selected. I suspect at least one item in my effects scale response set was a non-response (e.g., survival-threatening change).

9.4.4 Tie management rankings to the criterion variables.

The rankings performed by management in the second case study weren't accomplished using clear guidelines. I suggest obtaining four sets of rankings—one for each criterion variable used in the analysis. Management would then rank their

organization's work groups for how well their people are committed to the work group or organization based on values (normative commitment), how important pay and rewards for performance are to their commitment (instrumental commitment), how satisfied people are with their jobs (job satisfaction), and how well people work together as a group (group cohesion). Other rankings should accompany any additional criterion measures used in the analysis. A composite ranking could be compared with the canonical variable. However, the specifications for a composite ranking would be loose and management would drift toward their own biases for ranking instead of using the clearer specifications for comparison with the criterion rankings.

9.4.5 Refine the instrument's focus on the unit of analysis.

This was more of an issue with Shenandoah than with MSL. At MSL, work groups were well-defined and had no smaller or larger counterpart. At Shenandoah, I used the term "division" instead of work group because work groups existed within divisions at Shenandoah. Each division had one or more cost centers assigned to it and people often identified with their cost center first and their division second. Shenandoah had teams assembled to address particular issues. Finally, the Shenandoah divisions were heterogeneous compared to MSL's work groups. For example, group claims and marketing were both in the group marketing division. In group claims, employees were more passive and held the attitude that "the customer is always right," whereas the marketing employees were more aggressive and dealt with the customer in an effort to sell them insurance products. In MSL, employees in all divisions had similar educational backgrounds, possessed similar skills, and performed similar work such as writing proposals, working on grants and contracts, interacting with sponsors, and preparing reports and presentations.

As a consequence, several Shenandoah respondents told me they had difficulty answering for their entire division. The level of analysis and heterogeneity issues should be addressed in a future administration of the culture strength measurement instrument. Perhaps the most appropriate level of analysis is the largest homogeneous organizational unit. In Shenandoah's case, that would be the cost center and there are 45 cost centers in total. The difference from the 8-10 work groups or divisions found in many organizations would change the analysis dramatically as well as use organizational units with small numbers of people.

9.4.6 Compare work group values to the rest of the organization.

The survey instrument asked respondents to rate their work group values as currently practiced and how they ought to be practiced. One person at Shenandoah suggested a section where respondents could rate the rest of the organization as well as their division. Many people had no problem with their division but perceived other divisions create problems. Capturing data on a person's division and that person's perception of the rest of the organization would provide a means for analyzing these perceptions.

9.4.7 Conduct a social desirability check on the survey instrument.

A social desirability check would examine whether people responded the way they felt others wanted them to respond. A social desirability check can be done by administering the instrument to a population knowledgeable about instruments (professors, research professionals, graduate students) and instructing them to answer each item in the most socially desirable fashion—provide what they feel is the most socially desirable response. Then, the actual responses are compared with the socially desirable responses. If these

two sets of responses differ sufficiently, I would conclude a social desirability bias was not operating during the research.

9.4.8 Investigate the role of the second canonical variable.

The second canonical variables produced results quite different from the first canonical variables. (The independence between these two variables suggested the results they produce would be quite different.) For example, as the gap in job-related values (as defined by the job factor) increased, the criterion variables showed signs of increasing. And, increases in normative commitment or job satisfaction were accompanied by an increase in the culture gap factors. These were indeed puzzling findings and should be investigated.

9.4.9 Validate my culture gap measure against existing instruments.

The culture gap measure (between existing values and desired values) appeared as an effective predictor of the criterion variables, especially of group cohesion. A worthwhile exercise would be to administer my survey instrument and either the Kilmann-Saxton Culture Gap Survey or the Harrison and Stokes (1992) culture gap instrument (or both) to the same sample. Validating these instruments against each other should provide insight to the measurement of culture gap and the validity of my culture gap scale.

9.4.10 Investigate the role of the intensity-core values matrix.

For MSL, the matrix seemed to provide a method for predicting work group criterion measures on the basis of intensity and core values measures. For Shenandoah, the matrix merely illustrated the high level of dependence between the two measures. This dependence, if existent, was an inverse relationship between intensity and core values.

Perhaps the predictive finding holds if intensity and core values have an inverse relationship and doesn't hold otherwise. This notion could be tested once data are collected from many different organizations.

9.5 Closure

This research began with a seemingly simple question: What is culture strength and how do we measure it? The result has been a research odyssey traversing the fields of industrial engineering, materials engineering, psychology, management, organizational science, anthropology, and others. My attempt to put an empirical edge on a concept as abstract and ill-understood as culture strength is just the beginning of this research journey. I hope to contribute more to our ability to understand organizations from a cultural perspective and look forward to the contributions of others to this exciting, fun, and challenging research.

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Appendix A. Research Process Components

Appendix A.Research Process Components

Relevance of this Research

Managers and researchers see organizational culture as a valuable construct targeting change efforts to produce outcomes ranging from happier workers to improved bottom-line performance. But much, if not most, of the work on culture has been theoretical and conceptual. People speak of strong cultures, rites, ceremonies, organizational stories, and more without a strong empirical basis for relating changes to organizational outcomes.

My literature review discusses in detail the literature regarding culture's link to performance. I also reviewed several instruments for measuring culture. Many of these instruments lack the benefit of sophisticated methodology, meaning they were developed with little regard for content and construct validity and internal consistency. My review suggests: a) there are relatively few organizational instruments based on sophisticated methodology, b) there have been no attempts to develop a research-based instrument to measure cultural strength, and c) many of the existing instruments are dated. Of the eight instruments I reviewed, only three of them were developed in the past five years (1987 and later). My research proposes to meet this research and management need by developing, demonstrating, and validating an instrument to measure cultural strength, using a sophisticated methodology.

Research Question

What is meant by strength of an organization's culture and how can it be measured?

Operationalized Research Question

How can I work the components of culture and their combination into an instrument for extracting strength of culture from an organization and how can I demonstrate how to use the instrument and get useful results?

Research Purpose

To operationally define and measure the concept of cultural strength so we can begin to investigate the relationships between a culture's strength and other organizational variables and so we can measure the effect of interventions to change organizational culture.

Research Objectives

1. Operationally define cultural strength concept for organizations.
2. Develop an instrument for measuring cultural strength.
3. Use the instrument on one or more organizations to obtain measurements.

Problem Statement

This research aims to define and operationalize the concept of cultural strength and to develop, demonstrate, and validate an instrument to measure cultural strength. The results of these measurements can be used to compare organizations with respect to cultural strength and make recommendations for moving toward a more desirable organizational culture.

Premises/Delimitations

- Organizational culture is a state and, as such, has all the properties of a state, including state variables.
- Culture management is a process.
- Culture can be managed.
- We can begin to understand culture through an analysis of the next level of detail (systems approach).

I view culture as something organizations *have* rather than culture as something organizations *are*. Smircich (1983) made this distinction when discussing culture as a variable. Viewing culture as something organizations have sees culture more like a variable, perhaps a state variable. Claiming culture is something an organization is takes a metaphorical view of culture and implies less potential for culture management.

I define cultural strength as the intensity of perceived attitude and behavior structure against a set of organizational values, norms, and traditions.

This research will focus on defining and measuring cultural strength and showing an application in one or more cases. Later work may use this research as a foundation to expand the analysis to investigate the relationships between organizational culture and performance.

Conceptual Model

See the proposal document for the conceptual model. I've introduced a new model since the pre-proposal meeting.

Subproblems

1. Develop an operational definition of cultural strength.

   data interpretation: break down cultural strength into observable and measurable dimensions based on my operational definition

2. Develop an instrument for measuring strength of an organization's culture based on the operational definition.

   data interpretation: take observable and measurable dimensions and convert into attitudes and behaviors to be measured; conduct content validity and face validity tests with expert panel

3. Obtain measurements of cultural strength from one organization to demonstrate an application of the instrument.

   data interpretation: analyze measures of cultural strength against empirically determined factors of cultural strength; aggregate individual responses on instrument to reach a conclusion about the overall strength of the culture

4. Design and conduct a validity test of the instrument.

   data interpretation: check validity of my instrument against other scales within other instruments; high correlation indicates I'm measuring the same construct, moderate correlation indicates my instrument measures the construct similarly and at the same time measuring something different

Outputs

1. Operational definition of cultural strength concept for organizations.
2. An instrument combined with procedures for measuring cultural strength.
3. Measures of cultural strength from application of the instrument to an organization.
4. a. Results of validity testing.

   b. Suggestions for refinement of the instrument based on its application to organizations.

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Appendix C. Analogies in Scientific Research

Appendix C. Analogies in Scientific Work

My conceptual model uses an analogy from strength of materials. To justify the use of the stress-strain diagram and other concepts from strength of materials, I examined several sources in the literature for definitions, typologies, and guidelines for using analogies. I identified implications of the use of analogy for my research.

A Definition and Context

Analogical reasoning "involves the identification and transfer of structural information from a known system (the source) to a new and relatively unknown system (the target)" (Vosniadou, 1989, p. 414). The literature supports the use of analogies in scientific work (with some cautions) and has several classification schemes for analogies.

Gentner (1989) puts the analogy in context with literal similarity, abstraction, anomaly, and mere appearance. I've reproduced her Table 7.1 below.

Attributes	Relations	Example	
literal similarity	many	many	Milk is like water.
analogy	few	many	Heat is like water.
abstraction	few	many	Heat flow is a through-variable.
anomaly	few	few	Coffee is like the solar system.
mere appearance	few	many	The glass tabletop gleamed like water.

The analogy serves two purposes: 1) to clarify the researcher's thinking and 2) to help the researcher conceptualize—the researcher can define and describe the analogy for his or her purposes.

Leatherdale (1974) puts analogy in perspective with models and metaphors and says the analogy is a more fundamental and simple concept than a model or metaphor. He supports this claim by offering examples of how we talk about analogies, models, and metaphors: a metaphor expresses an analogy or a model works by analogy. Leatherdale says an analogy in scientific thinking refers to a "resemblance of relations" (p. 2) and proceeds to classify analogies into two different types. The two types are imported analogies and manifest analogies.

Typologies for Analogies

Hesse (1966, quoted in Keane, 1988) refers to the same typology for analogies as Leatherdale does but with different terminology. Hesse uses the term vertical relations for imported analogies and horizontal properties for manifest analogies.

Imported analogies involve "general unanalyzed or unanalyzable resemblance between two things" (p. 3). He says imported analogies "may be fundamental to science either in its early stages or else as part of an original insight at more sophisticated levels" (p. 3). He adds the unanalyzable portion of the imported analogy doesn't lend to much scientific thinking. Imported analogies are based on novel or esoteric relationships between two systems.

Manifest analogies involve "resemblance in an ensemble of qualities or of properties or attributes (not relations) given in an immediate sense experience" (p. 3).

Vosniadou (1989) cites the categorization of analogies into between-domain and within-domain analogies. Between-domain analogies involve two systems belonging to fundamentally different or remote conceptual domains yet sharing a similar explanatory

structure (e.g., electrons and planets). Within-domain analogies involve two systems belonging to the same or very similar conceptual domains (e.g., styrofoam cup and ceramic mug).

A field of study known as synectics makes use of techniques for "making the familiar strange" (Gordon, 1961, p. 33). Synectics makes use of analogies and other methods to gain different perspectives to solve problems. Gordon says we apply rational models and techniques for making the strange familiar and his thrust is on making the familiar strange. Gordon says to make the familiar strange we "distort, invert, or transpose the everyday ways of looking and responding which render the world a secure and familiar place" (p. 34). Gordon discusses several types of analogies for making the familiar strange. *Personal* analogy involves placing one's self inside the problem space and imagining what one would experience and using this form of thought to stimulate ideas for potential solutions. *Direct* analogy employs parallel facts, knowledge, or technology and is the type of analogy used frequently in research and organizational situations. *Symbolic* analogy uses objective and impersonal images to characterize a situation. *Fantasy* analogy follows a wish-fulfilment logic in problem-solving.

Guidelines for Using Analogies

Taking the analogy developed for clarifying thinking and making it into a reality is a "fundamental mistake" and a "classic logic problem", according to Koball (1992, personal communication). Koball adds it's perfectly acceptable to consult people from other disciplines, but the researcher shouldn't take the analogy as reality.

Leatherdale (1974) cautions the use of manifest analogies should not lead to overhasty generalizations and the assumption of more regularity occurring in the world than is actually the case.

Vosniadou and Ortony (1989) acknowledge the use of analogies to help researchers grasp difficult concepts, but not to let the analogy become a later impediment to "fuller or more correct understandings" (p. 13).

Implications for Research

The use of analogies in research has advantages and disadvantages. I discuss some of the advantages and disadvantages vis-à-vis my decision to use an analogy in my research.

Advantages

I list several advantages of analogies in research. On the positive side, analogies keep us from "reinventing the wheel" when confronted with seemingly unique research problems. We can transfer systems or components of systems from another domain to the domain of interest if the analogy is valid. Therefore, the researcher's productivity is increased by using the analogy.

Analogies tend to provide new alternatives to viewing the research and may stimulate new and/or different modes of thinking about the research problem or situation.

The analogy may suggest components and relationships the researcher may not have thought of otherwise.

The analogy may suggest a physical counterpart to a more ideational system (e.g., culture). In my case, the physical nature of the strength of materials analogy facilitates

thinking, especially when much of the researcher's training has been in physical systems (i.e., engineering).

The use of analogy supports systems thinking by looking outside the immediate system for ideas.

Disadvantages

The use of analogies can also work against the researcher's goals. I list several disadvantages of the analogy.

Components and relationships suggested by the analogy may not be valid and may lead the researcher to erroneous conclusions or logic.

The researcher may tend to drive the analogy too far and begin to believe the analogy is the reality. This suggests the researcher may allow the analogy to overly influence the research; the analogy is a tool to help the research and not the subject of research.

System peculiarities in the system where the analogy originates may divert the researcher from his or her line of inquiry. Without the analogy, the researcher may not have been thrown off track. This is a risk the researcher takes when using an analogy.

The analogy may be limited and therefore stifle productive thinking at some point during its use.

Summary

I acknowledge these advantages and disadvantages with respect to my research and conclude the advantages of using the analogy outweigh the disadvantages. I limit the use of the analogy to stimulating my development of operational definitions of culture strength

and supplying categories for the effects response set. Though many additional relationships and components of the analogy may transfer to the study of organizations (including equations and mathematical formulae), I stop short and make minimal use of the analogy. Future research may wish to investigate the strength of materials analogy further for its value in organizational research.

The analogy is a useful tool for conceptualizing a research problem and generating hypotheses about relationships. One major analogy type is based on similarity of relationships between the two systems in the analogy. The researcher must maintain a clear demarcation between the analogy and the reality and not lend the analogy greater credence than it deserves.

No analogy is perfect. A perfect analogy is an oxymoron and suggests the two systems are the same—in which case we're no longer dealing with an analogy. My use of the stress-strain diagram to assist in operationalizing culture strength exemplifies what Leatherdale (1974) calls imported analogies. Using Gentner's (1989) typology, I have an analogy as opposed to a literal similarity or an abstraction because the stress-strain diagram and culture strength share few attributes yet the stress-strain diagram suggests many relationships in the culture strength domain. Gentner says the focus of an analogy is on relationships.

The body of knowledge I intend to impact is the organizational culture literature, not literature associated with the analogy such as strength of materials. The analogy supports my research but does not drive my research. Enough literature exists on culture to ground my research, yet significant gaps such as the lack of an operational definition for strength suggest looking outside the cultural and organizational literature for analogies and other forms of inspiration and ideas.

Appendix D. Stress-Strain Diagrams

Appendix D. Stress-Strain Diagrams

I use a stress-strain diagram in my conceptual model for operationalizing culture strength in organizations. But why use a stress-strain diagram? What does an organization have in common with strength of materials? The stress-strain diagram operationalizes the notion of strength in materials testing. In fact, several different kinds of strength are derived from the diagram. The yield strength represents the point where the material "gives," and small increases in the load beyond the yield point produce large amounts of deformation or strain. The ultimate strength represents the greatest amount of force or stress the material can endure before beginning the path to the failure point.

What issues, ideas, and concepts from strength of materials are applicable in this research? The use of the term "stress" in both strength of materials and in organizations is unfortunate because a body of literature exists on organizational stress. The analogous component of engineering stress in organizations is not organizational stress. The word "stress" describes different constructs or ideas in the organizational and strength of materials domains. In strength of materials, stress is force/unit area. Forces act on organizations and are applied over an area—a geographic area, functional area, area of expertise, etc.

I'm not addressing organizational stress as a construct, although I may find organizational stress incidental to my work. The meaning attributed to stress differs from strength of materials to organizations. Issues, ideas, and concepts I do find important are force/unit area (stress), change in length/unit length (strain), different kinds of loading, forces, effects, and the fact that different materials behave differently. Forces acting on a

geographic portion of an organization are analogous to stress in strength of materials. Effects or changes due to these forces are analogous to strain. Just as forces can be loaded differently onto materials, so too in organizations can forces be applied differently. Organizations respond differently when forces are applied, just as different materials respond differently to similar applications of force. Enough analogous pieces exist, providing support for using the analogy in my research.

At least four types of issues from strength of materials apply to organizations through the stress-strain diagram analogy. First, different types of forces act on the organization, just as they do in a materials context. These forces are presented in the main text, but they include competitors, suppliers, customers, regulators, and others. Second, different types of loading are experienced by organizations and materials. Materials experience tensile, compressive, and torsional loadings as well as combinations of these three basic forms of loading. Organizations experience forces opposed to each other, aligned with each other, and even forces acting in different planes (i.e., not collinear). Third, different types of effects are experienced by organizations and materials. The material experiences elastic and plastic deformation, yield, and failure. The organization may experience some analogous effects, but it will produce an effect or set of effects from application and loading of forces. Fourth, different types of consequences result from forces being loaded and effects produced. For the organization, the consequences involve what the organization changes to as a result of forces.

Strain, in strength of materials, refers to the change in length/unit length of the member being studied. Strain is the effect of stress applied to the member. In organizations, I've already made the case for forces being the analog to stress. Organizational strain, however, is somewhat more difficult. I use the defined stages of the stress-strain diagram to guide my operationalization of organizational strain. On the

stress-strain diagram, we have elastic, yield, strain-hardening, and localized deformation stages. Strength of materials defines several points within these stages. The stages and points on the stress-strain diagram inspired the development of an analogous concept for organizations. Organizational strain, which I call effects, isn't as clean an analogous piece as forces and stress, but it's sufficient to support the extension of the analogy to the relationship between stress and strain in organizations.

Not only did I use stress and strain components to find analogies in organizations, but the relationship between stress and strain is perhaps the strength of material analogy's greatest contribution. The strength of a material (or its several strengths) is operationalized by the stress-strain diagram which relates stress to strain. My operationalization of culture strength is analogous, being constructed, in part, from the relationships between forces and effects. In this section, I discuss the stress-strain diagram as an integral component of my conceptual model for studying culture strength. In the methodology section, I discuss how I will use the relationship between forces and effects to provide measures of an organization's culture strength.

The stress-strain diagram (in Figure 1) works as a conceptual model for my research. I use the stress-strain diagram to help me operationalize culture strength as a function of forces and effects acting on the organization. I can't measure forces acting on an organization like the materials engineer measures stress acting on a structural member. Therefore, I can't construct a diagram analogous with the stress-strain diagram. The diagram's stages have face validity with organizations and culture. Organizations can experience forces and change temporarily (elastic deformation) and return to their approximate original form. Organizations can experience forces and change permanently (plastic deformation). Organizations reach a point where they can no longer fend off forces and the application of addition force causes great change in the organization (yield

point). Organizations regain their ability to fend off forces and produce little change for application of additional force (strain-hardening). Organizations reach a point of ultimate strength, beyond which application of force will lead to their failure. Organizations have failure points, which can be reached when the forces push the organization to the point of failure.

The management systems engineering discipline emphasizes the use of the engineering process applied to management and the management process, analogous to chemical engineering emphasizing the use of the engineering process applied to chemistry and the chemical process. (See Kurstedt (in press) for a detailed description of the management systems engineering discipline.) I've conceptualized culture strength, in part, using the stress-strain diagram from strength of materials as shown in Figure 1. For a given material, a stress-strain diagram is constructed via a tension test, compression test, or torsion test. The data corresponding to stress and strain (as measured by load and deformation) are plotted as the material specimen is stressed until failure occurs (Cheng, 1986). Stress-strain diagrams are customarily plotted with stress as the ordinate (y-axis) and strain as the abscissa (x-axis).

A stress-strain diagram has four stages (Cheng, 1986): elastic stage, yield stage, strain-hardening stage, and localized deformation stage. I'll discuss each of these stages briefly[14].

Elastic stage. The elastic stage exists between the origin and point *p*. Point *p* is the proportional limit and the plot is a straight line up to point *p* (stress is proportional to the strain). A modulus of elasticity relates stress and strain in the elastic stage. Stress ceases to be proportional to the strain beyond point *p* and up to point *e* the deformation is still

[14]Much of this discussion was based on Cheng's (1986) description of the stress-strain diagram as used in strength of materials.

elastic, meaning that the specimen will return to its initial size and shape upon removal of the load. For practical purposes, point *e* is not distinguished from *p*.

Beyond the elastic limit, only a portion of the deformation can be recovered when the load is removed. The remaining deformation is called permanent deformation or "set" and is referred to as plastic deformation. Recoverable deformation is called elastic deformation.

Yield stage. Beyond *p*, the slope of the stress-strain diagram in Figure E.1 gradually decreases. At point *y*, the yield point, the slope is zero and the diagram remains horizontal for a small increase in strain. The stress corresponding to *y* is called the yield strength.

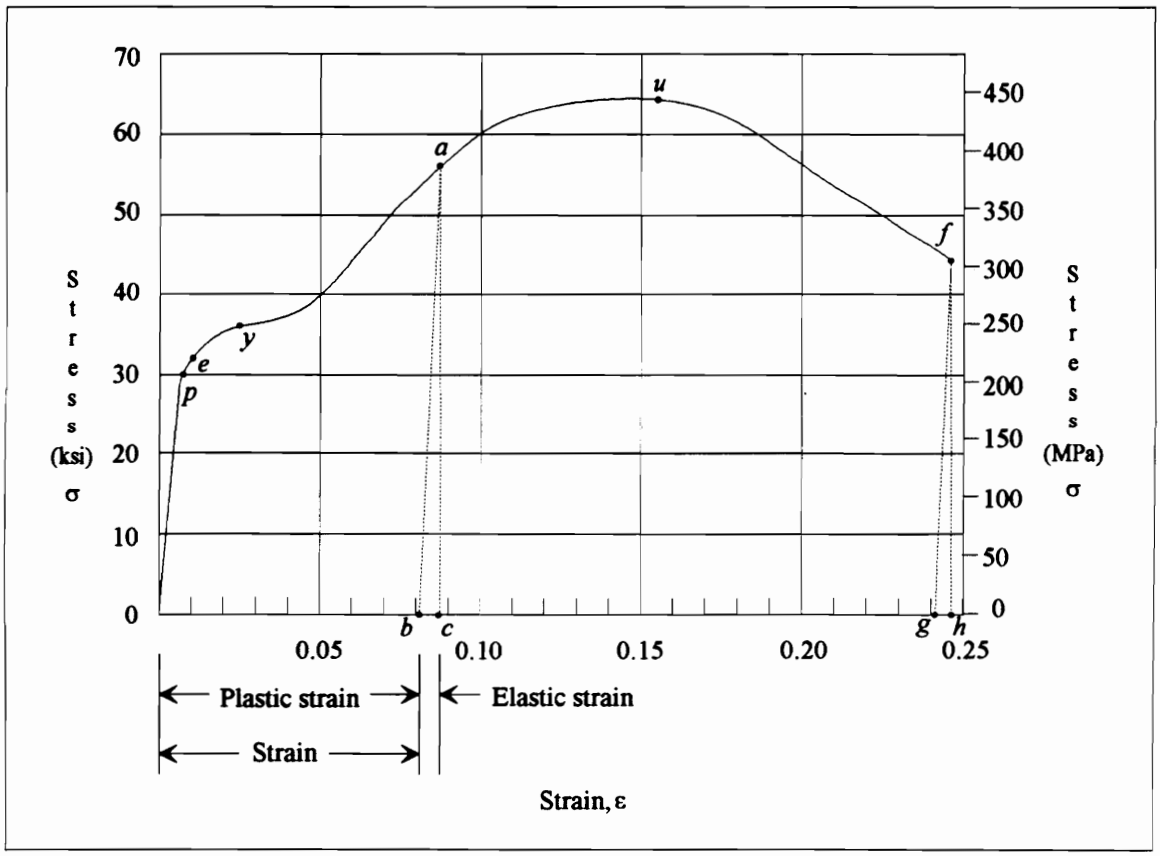


Figure 1. This stress-strain diagram plots stress against strain for a particular material specimen under tensile load (*from Cheng, 1986, p. 54*).

Strain-hardening stage. The material resists deformation after the yield stage is passed. The material "strain hardens" because of plastic deformation and this means greater stresses are required to create deformation in the specimen. The stress-strain diagram reaches its highest point *u* where the corresponding stress is called the ultimate strength and is the maximum stress the material can resist.

Localized deformation stage. During the tension test for building the stress-strain diagram, the material's lateral dimension contracts. This contraction, called necking, becomes more pronounced after point *u* is reached. The tensile force required to produce strain in the specimen quickly decreases. When the stress-strain diagram drops to point *f*, the material breaks suddenly into two parts and the failure point is reached. Because of the material's behavior after point *u* is reached (necking and failure), the ultimate strength is an important index of the material's strength.

I use these stages of the stress-strain diagram to guide my development of a set of eight effects corresponding to each of the forces acting on the organization.

Appendix E. MSL Pre-Test Materials

MEMORANDUM

February 2, 1993

To: Selected MSL'ers

From: Larry Mallak

Subject: Culture Survey Pre-test

Before I distribute the culture survey to everyone at MSL, I'd like your feedback. Please read the attached cover letter and fill out the survey. Be sure to note your beginning and ending times in the spaces provided. While you're filling out the survey, feel free to write comments where you don't understand the item or the item isn't clear or easily answered.

Your responses will be integrated with the rest of MSL. So when I distribute the survey to all MSL next week, please do not respond again.

I'm also interested in your feedback on identifying your work group by name. This data point is crucial to my research--without it the survey must be discarded. I will report the results in my dissertation using generic work group names, like A, B, C, etc. Do you have comments either for or against identifying your work group by name in the survey? Please write those down on this cover letter and return to me.

Also, please note any comments you have concerning the cover letter. Does it motivate you to fill out the survey? Does it make clear the purpose of the survey and how the data will be used?

When you're finished filling out the survey, I'd like to meet with you briefly to get your feedback. You may send the survey back through MSL mail rather than give to me directly, if you wish.

I'd like your completed survey by Friday, February 5. I'll call you on Friday to get your feedback on the survey.

Thanks for helping!

MEMORANDUM

February 8, 1993

To: All MSL'ers

From: Larry Mallak

Subject: Culture Survey

I'm conducting a survey of the cultures of several organizations as part of my dissertation and I'd like your help. I'm looking at MSL's culture and the culture of Shenandoah Life in Roanoke. The survey's questions focus on the work group perspective (e.g., CEL, OSL, STG) about MSL's values and how you feel about the organization.

One data point crucial to my research is identifying which work group you are in.

Please identify your MSL work group now by circling the appropriate work group abbreviation:

CEL DSG EMG ESL LSS OSL STG TTL

My intent in collecting these data is to learn more about the role and function of culture in organizations. Specifically, your responses will help me develop a procedure for measuring the strength of culture at the organizational and the work group level.

I must emphasize this survey is purely for my research. The timing of the recent MSL changes and this survey are coincidental: This survey will not provide data for MSL's strategic planning. I've pitched the survey idea to the managers, the Process Improvement Council, and others solely to help achieve a high response rate. The results will be reported in a doctoral dissertation along with the results from other organizations.

Your responses are confidential. I will be the only one to see the completed surveys. There is no place to put your name on the survey and I ask that you please do not identify yourself. I'll personally destroy the completed surveys once I've entered and verified the data.

This survey takes approximately 20 minutes. I think you'll enjoy filling it out. If you have questions, please feel free to either call me at 1-3348 or leave me a note or stop by. I appreciate you helping me in my quest to get my dissertation done.

Please send your completed survey to me via MSL mail. Thanks!

Time started: ____

Culture Survey

First, before beginning this survey, please circle the MSL work group where you are currently employed.
CEL DSG EMG ESL LSS OSL STG TTL

Please be sure to answer this item. If it is left blank, your responses to the rest of the survey will be unusable.

This survey seeks your perceptions of MSL's culture as practiced in MSL's work groups. The information you provide will be kept confidential. The information will be used to conduct research on organizational culture in general. The results will be reported in a Ph.D. dissertation. These results will be presented in a manner where no individuals can be identified. The goal of this survey is to provide information to support academic research.

Keep your MSL work group in mind when responding to the survey items. The focus of this survey is on the MSL work groups, and not the overall MSL organization.

Mark the box corresponding to the extent to which you agree or disagree with each of the values listed below as being characteristic of your work group under the *existing* culture. Then estimate the percent of people in your work group whose behavior reflects that value.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percent of people in your work group whose behavior reflects this value.
1. flexibility	☐	☐	☐	☐	☐	☐	☐
2. adaptability	☐	☐	☐	☐	☐	☐	☐
3. stability	☐	☐	☐	☐	☐	☐	☐
4. predictability	☐	☐	☐	☐	☐	☐	☐
5. being innovative	☐	☐	☐	☐	☐	☐	☐
6. being quick to take advantage of opportunities	☐	☐	☐	☐	☐	☐	☐
7. a willingness to experiment	☐	☐	☐	☐	☐	☐	☐
8. risk taking	☐	☐	☐	☐	☐	☐	☐
9. being careful	☐	☐	☐	☐	☐	☐	☐
10. autonomy	☐	☐	☐	☐	☐	☐	☐
11. being rule oriented	☐	☐	☐	☐	☐	☐	☐

existing culture

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percent of people in your work group whose behavior reflects this value.
12. being analytical	☐	☐	☐	☐	☐	☐	☐
13. paying attention to detail	☐	☐	☐	☐	☐	☐	☐
14. being precise	☐	☐	☐	☐	☐	☐	☐
15. being team oriented	☐	☐	☐	☐	☐	☐	☐
16. sharing information freely	☐	☐	☐	☐	☐	☐	☐
17. emphasizing a single culture throughout the organization	☐	☐	☐	☐	☐	☐	☐
18. being people oriented	☐	☐	☐	☐	☐	☐	☐
19. fairness	☐	☐	☐	☐	☐	☐	☐
20. respect for the individual's right	☐	☐	☐	☐	☐	☐	☐
21. tolerance	☐	☐	☐	☐	☐	☐	☐
22. informality	☐	☐	☐	☐	☐	☐	☐
23. being easy going	☐	☐	☐	☐	☐	☐	☐
24. being calm	☐	☐	☐	☐	☐	☐	☐
25. being supportive	☐	☐	☐	☐	☐	☐	☐
26. being aggressive	☐	☐	☐	☐	☐	☐	☐
27. decisiveness	☐	☐	☐	☐	☐	☐	☐
28. action orientation	☐	☐	☐	☐	☐	☐	☐
29. taking initiative	☐	☐	☐	☐	☐	☐	☐
30. being reflective	☐	☐	☐	☐	☐	☐	☐
31. achievement orientation	☐	☐	☐	☐	☐	☐	☐
32. being demanding	☐	☐	☐	☐	☐	☐	☐
33. taking individual responsibility	☐	☐	☐	☐	☐	☐	☐

2

	existing culture						
	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percent of people in your work group whose behavior reflects this value.
34. having high expectations for performance	☐	☐	☐	☐	☐	☐	☐
35. opportunities for professional growth	☐	☐	☐	☐	☐	☐	☐
36. high pay for good performance	☐	☐	☐	☐	☐	☐	☐
37. security of employment	☐	☐	☐	☐	☐	☐	☐
38. offers praise for good performance	☐	☐	☐	☐	☐	☐	☐
39. low level of conflict	☐	☐	☐	☐	☐	☐	☐
40. confronting conflict directly	☐	☐	☐	☐	☐	☐	☐
41. developing friends at work	☐	☐	☐	☐	☐	☐	☐
42. fitting in	☐	☐	☐	☐	☐	☐	☐
43. working in collaboration with others	☐	☐	☐	☐	☐	☐	☐
44. enthusiasm for the job	☐	☐	☐	☐	☐	☐	☐
45. working long hours	☐	☐	☐	☐	☐	☐	☐
46. not being constrained by many rules	☐	☐	☐	☐	☐	☐	☐
47. an emphasis on quality	☐	☐	☐	☐	☐	☐	☐
48. being distinctive--different from others	☐	☐	☐	☐	☐	☐	☐
49. having a good reputation	☐	☐	☐	☐	☐	☐	☐
50. being socially responsible	☐	☐	☐	☐	☐	☐	☐
51. being results oriented	☐	☐	☐	☐	☐	☐	☐
52. having a clear guiding philosophy	☐	☐	☐	☐	☐	☐	☐
53. being competitive	☐	☐	☐	☐	☐	☐	☐
54. being highly organized	☐	☐	☐	☐	☐	☐	☐

3

Mark the box corresponding to the extent to which you agree or disagree with each of the values listed below as being characteristic of your work group under the *desired* culture.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
55. flexibility	☐	☐	☐	☐	☐	☐
56. adaptability	☐	☐	☐	☐	☐	☐
57. stability	☐	☐	☐	☐	☐	☐
58. predictability	☐	☐	☐	☐	☐	☐
59. being innovative	☐	☐	☐	☐	☐	☐
60. being quick to take advantage of opportunities	☐	☐	☐	☐	☐	☐
61. a willingness to experiment	☐	☐	☐	☐	☐	☐
62. risk taking	☐	☐	☐	☐	☐	☐
63. being careful	☐	☐	☐	☐	☐	☐
64. autonomy	☐	☐	☐	☐	☐	☐
65. being rule oriented	☐	☐	☐	☐	☐	☐
66. being analytical	☐	☐	☐	☐	☐	☐
67. paying attention to detail	☐	☐	☐	☐	☐	☐
68. being precise	☐	☐	☐	☐	☐	☐
69. being team oriented	☐	☐	☐	☐	☐	☐
70. sharing information freely	☐	☐	☐	☐	☐	☐
71. emphasizing a single culture throughout the organization	☐	☐	☐	☐	☐	☐
72. being people oriented	☐	☐	☐	☐	☐	☐
73. fairness	☐	☐	☐	☐	☐	☐
74. respect for the individual's right	☐	☐	☐	☐	☐	☐
75. tolerance	☐	☐	☐	☐	☐	☐
76. informality	☐	☐	☐	☐	☐	☐
77. being easy going	☐	☐	☐	☐	☐	☐
78. being calm	☐	☐	☐	☐	☐	☐
79. being supportive	☐	☐	☐	☐	☐	☐
80. being aggressive	☐	☐	☐	☐	☐	☐
81. decisiveness	☐	☐	☐	☐	☐	☐

4

desired culture

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
82. action orientation	☐	☐	☐	☐	☐	☐
83. taking initiative	☐	☐	☐	☐	☐	☐
84. being reflective	☐	☐	☐	☐	☐	☐
85. achievement orientation	☐	☐	☐	☐	☐	☐
86. being demanding	☐	☐	☐	☐	☐	☐
87. taking individual responsibility	☐	☐	☐	☐	☐	☐
88. having high expectations for performance	☐	☐	☐	☐	☐	☐
89. opportunities for professional growth	☐	☐	☐	☐	☐	☐
90. high pay for good performance	☐	☐	☐	☐	☐	☐
91. security of employment	☐	☐	☐	☐	☐	☐
92. offers praise for good performance	☐	☐	☐	☐	☐	☐
93. low level of conflict	☐	☐	☐	☐	☐	☐
94. confronting conflict directly	☐	☐	☐	☐	☐	☐
95. developing friends at work	☐	☐	☐	☐	☐	☐
96. fitting in	☐	☐	☐	☐	☐	☐
97. working in collaboration with others	☐	☐	☐	☐	☐	☐
98. enthusiasm for the job	☐	☐	☐	☐	☐	☐
99. working long hours	☐	☐	☐	☐	☐	☐
100. not being constrained by many rules	☐	☐	☐	☐	☐	☐
101. an emphasis on quality	☐	☐	☐	☐	☐	☐
102. being distinctive--different from others	☐	☐	☐	☐	☐	☐
103. having a good reputation	☐	☐	☐	☐	☐	☐
104. being socially responsible	☐	☐	☐	☐	☐	☐
105. being results oriented	☐	☐	☐	☐	☐	☐
106. having a clear guiding philosophy	☐	☐	☐	☐	☐	☐
107. being competitive	☐	☐	☐	☐	☐	☐
108. being highly organized	☐	☐	☐	☐	☐	☐

5

For the following conditions, please mark whether the listed value should change relative to the existing culture. Use a "+" to indicate the value should be more characteristic of your work group culture under the condition or a "-" to indicate the value should be less characteristic of your work group under the condition.

+ = more important under this condition - = less important under this condition	A key customer is extremely unhappy with your firm's service.	A key customer is delighted with your firm's service.	A problem with one of your firm's outputs receives national attention.	One of your firm's outputs receives national recognition.	Force 5	Force 6
109. flexibility	☐	☐	☐	☐	☐	☐
110. adaptability	☐	☐	☐	☐	☐	☐
111. stability	☐	☐	☐	☐	☐	☐
112. predictability	☐	☐	☐	☐	☐	☐
113. being innovative	☐	☐	☐	☐	☐	☐
114. being quick to take advantage of opportunities	☐	☐	☐	☐	☐	☐
115. a willingness to experiment	☐	☐	☐	☐	☐	☐
116. risk taking	☐	☐	☐	☐	☐	☐
117. being careful	☐	☐	☐	☐	☐	☐
118. autonomy	☐	☐	☐	☐	☐	☐
119. being rule oriented	☐	☐	☐	☐	☐	☐
120. being analytical	☐	☐	☐	☐	☐	☐
121. paying attention to detail	☐	☐	☐	☐	☐	☐
122. being precise	☐	☐	☐	☐	☐	☐
123. being team oriented	☐	☐	☐	☐	☐	☐
124. sharing information freely	☐	☐	☐	☐	☐	☐
125. emphasizing a single culture throughout the organization	☐	☐	☐	☐	☐	☐
126. being people oriented	☐	☐	☐	☐	☐	☐
127. fairness	☐	☐	☐	☐	☐	☐
128. respect for the individual's right	☐	☐	☐	☐	☐	☐
129. tolerance	☐	☐	☐	☐	☐	☐
130. informality	☐	☐	☐	☐	☐	☐
131. being easy going	☐	☐	☐	☐	☐	☐
132. being calm	☐	☐	☐	☐	☐	☐
133. being supportive	☐	☐	☐	☐	☐	☐
134. being aggressive	☐	☐	☐	☐	☐	☐
135. decisiveness	☐	☐	☐	☐	☐	☐

6

+ = more important under this condition
- = less important under this condition

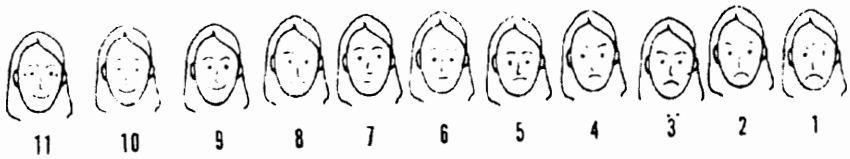
	A key customer is extremely unhappy with your firm's service.	A key customer is delighted with your firm's service.	A problem with one of your firm's outputs receives national attention.	One of your firm's outputs receives national recognition.	Force 5	Force 6
136. action orientation	☐	☐	☐	☐	☐	☐
137. taking initiative	☐	☐	☐	☐	☐	☐
138. being reflective	☐	☐	☐	☐	☐	☐
139. achievement orientation	☐	☐	☐	☐	☐	☐
140. being demanding	☐	☐	☐	☐	☐	☐
141. taking individual responsibility	☐	☐	☐	☐	☐	☐
142. having high expectations for performance	☐	☐	☐	☐	☐	☐
143. opportunities for professional growth	☐	☐	☐	☐	☐	☐
144. high pay for good performance	☐	☐	☐	☐	☐	☐
145. security of employment	☐	☐	☐	☐	☐	☐
146. offers praise for good performance	☐	☐	☐	☐	☐	☐
147. low level of conflict	☐	☐	☐	☐	☐	☐
148. confronting conflict directly	☐	☐	☐	☐	☐	☐
149. developing friends at work	☐	☐	☐	☐	☐	☐
150. fitting in	☐	☐	☐	☐	☐	☐
151. working in collaboration with others	☐	☐	☐	☐	☐	☐
152. enthusiasm for the job	☐	☐	☐	☐	☐	☐
153. working long hours	☐	☐	☐	☐	☐	☐
154. not being constrained by many rules	☐	☐	☐	☐	☐	☐
155. an emphasis on quality	☐	☐	☐	☐	☐	☐
156. being distinctive--different from others	☐	☐	☐	☐	☐	☐
157. having a good reputation	☐	☐	☐	☐	☐	☐
158. being socially responsible	☐	☐	☐	☐	☐	☐
159. being results oriented	☐	☐	☐	☐	☐	☐
160. having a clear guiding philosophy	☐	☐	☐	☐	☐	☐
161. being competitive	☐	☐	☐	☐	☐	☐
162. being highly organized	☐	☐	☐	☐	☐	☐

The following items ask your opinions about your job and working at MSL. Please indicate your level of agreement or disagreement by checking the box corresponding to your level of agreement with the statement.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
163. If the values of MSL were different, I would not be attached to MSL.	☐	☐	☐	☐	☐	☐
164. Since joining MSL, my personal values and those of the organization have become more similar.	☐	☐	☐	☐	☐	☐
165. I prefer MSL to other organizations because of what it stands for, its values.	☐	☐	☐	☐	☐	☐
166. My attachment to MSL is primarily based on the similarity of my values and those represented by the organization.	☐	☐	☐	☐	☐	☐
167. What MSL stands for is important to me.	☐	☐	☐	☐	☐	☐
168. I am proud to tell others I am a part of MSL.	☐	☐	☐	☐	☐	☐
169. I talk up MSL to my friends as a great organization to work for.	☐	☐	☐	☐	☐	☐
170. I feel a sense of "ownership" for MSL rather than just being an employee.	☐	☐	☐	☐	☐	☐
171. Unless I'm rewarded for it in some way I see no reason to expend extra effort on behalf of MSL.	☐	☐	☐	☐	☐	☐
172. How hard I work for MSL is directly linked to how much I'm rewarded.	☐	☐	☐	☐	☐	☐
173. My private views about MSL are different from those I express publicly.	☐	☐	☐	☐	☐	☐
174. In order for me to get rewarded around here, it's necessary for me to express the right attitude.	☐	☐	☐	☐	☐	☐

8

175. Please respond to the following faces scale by circling the face most representative of how you feel about your job at MSL.



The statements below concern common opinions people express about their work groups. Please indicate your level of agreement or disagreement with each statement.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
176. The group is very close.	☐	☐	☐	☐	☐	☐
177. I trust the group completely.	☐	☐	☐	☐	☐	☐
178. The group members do not really understand each other.	☐	☐	☐	☐	☐	☐
179. I distrust this group.	☐	☐	☐	☐	☐	☐
180. I like this group much more than other groups I have participated in.	☐	☐	☐	☐	☐	☐
181. I really enjoy this group.	☐	☐	☐	☐	☐	☐
182. I understand the people in this group.	☐	☐	☐	☐	☐	☐
183. I dislike this group.	☐	☐	☐	☐	☐	☐
184. I interact/communicate with this group more than in most groups I have been in.	☐	☐	☐	☐	☐	☐
185. This group is not very close at all.	☐	☐	☐	☐	☐	☐
186. The members of this group share a lot in common.	☐	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
187. The group members do a lot of helpful things for each other.	☐	☐	☐	☐	☐	☐
188. I feel very close to this group.	☐	☐	☐	☐	☐	☐
189. The group members feel very close to each other.	☐	☐	☐	☐	☐	☐
190. We (the group) share some private ways of communicating with each other.	☐	☐	☐	☐	☐	☐
191. Our group relationship satisfies an important need for group affiliation.	☐	☐	☐	☐	☐	☐
192. There is a great deal of hostility and aggression among the group members.	☐	☐	☐	☐	☐	☐
193. I feel an interpersonal need for affiliation with the group.	☐	☐	☐	☐	☐	☐

For the following items, please choose the action you feel would most likely occur. Choose your response from the following set:

A. The force produces no change in the organization, neither temporary or permanent.
B. The force produces a temporary change in the organization, but the organization returns to normal shortly after the force is removed.
C. The force produces a combination of temporary and permanent change in the organization--some things change temporarily and then return to normal, while others stay changed permanently.
D. The force produces permanent change throughout the organization and the organization does not return to normal.
E. The force causes the organization to "give," meaning the organization becomes sensitive to small increases in the force and dramatic changes occur in the organization as a result.
F. The force causes a great amount of permanent change in the organization beyond the point where it "gives," but the net effect is to make the organization tougher.
G. The force pushes the organization beyond its breaking point and threatens its survival.
H. The force causes the total failure of the organization.
I. No opinion/don't know.

194. Significant business is lost to a competitor.
A B C D E F G H I

195. Ten new customers show a sudden interest in your firm.
A B C D E F G H I

196. All federal and state business regulations are lifted.
A B C D E F G H I

197. New regulations require increased scrutiny by outsiders.
A B C D E F G H I

198. A key customer is extremely unhappy with your firm's service.
A B C D E F G H I

199. A key customer is delighted with your firm's service.
A B C D E F G H I

200. A problem with one of your firm's products/services/deliverables receives national attention.
A B C D E F G H I

201. One of your firm's products/services/deliverables receives national recognition.
A B C D E F G H I

202. Your firm adopts a new technology and dramatically reduces the time required to produce a key product/service/deliver able.
A B C D E F G H I

203. A competitor adopts a new, expensive technology allowing that competitor to dramatically reduce the time required to produce a key produce/service/deliverable.
A B C D E F G H I

Thank you for taking time to fill out this survey. Please return your completed survey to Larry Mallak via MSL mail.

Time finished: _____

11

Appendix F. MSL Survey Instrument

MEMORANDUM

February 10, 1993

To: All full-time MSL'ers

From: Larry Mallak

Subject: I need your help

I'm at the last stage of my dissertation on culture and I need your help. I need to have two organizations answer questions in the attached survey for me to obtain my data. The two organizations I'm surveying are MSL and Shenandoah Life (in Roanoke). (Hanford is so large and unwieldy I won't get data from them in time to graduate in May. Brian's group will collect those data after I'm off in my new job.) Since organizations have subcultures within their overall culture that affect each other, I need to know what work group you're in (e.g., CEL, DSG). I need no other data about you.

Please identify your MSL work group now by circling the appropriate work group abbreviation:

CEL DSG EMG ESL LSS OSL STG TTL

My intent in collecting these data is to learn more about the role and function of culture in organizations. Specifically, your responses will help me develop a procedure for measuring the strength of culture at the organizational and the work group level.

I must emphasize this survey is purely for my research. The timing of the recent MSL changes and my graduation date (and therefore this survey) is coincidental: This survey will not provide data for MSL's strategic planning. I've presented the survey idea to the managers, the Process Improvement Council, and others solely to help achieve a high response rate. The results will be reported in a doctoral dissertation along with the results from other organizations.

Your responses are confidential. There is no place to put your name on the survey and I ask that you please do not identify yourself. I'll personally destroy the completed surveys once I've entered and verified the data.

You should be able to complete the survey in appproximately 30 minutes. I think you'll enjoy filling it out. If you have questions, please feel free to either call me at 1-3348 or leave me a note or stop by. I appreciate you helping me in my quest to get my dissertation done.

Please send your completed survey to me by **Tuesday, February 16** via MSL mail or drop it at my desk. Thanks!

SPECIAL NOTE

I urge you to support Larry's research by completing the attached questionnaire. Our mission and vision statements emphasize the importance of our contribution to the academic mission of the university. Helping Larry is one way we can do this.

Ron Simpson

Culture Survey

First, before beginning this survey, please circle the MSL work group where you are currently employed.
CEL DSG EMG ESL LSS OSL STG TTL

Please be sure to answer this item. If it is left blank, your responses to the rest of the survey will be unusable.

This survey seeks your perceptions of MSL's culture as practiced in MSL's work groups. The information you provide will be kept confidential. The information will be used to conduct research on organizational culture in general. The results will be reported in a Ph.D. dissertation. These results will be presented in a manner where no individuals can be identified. The goal of this survey is to provide information to support academic research.

Keep your MSL work group in mind when responding to the survey items. The focus of this survey is on the ***MSL work groups***, and not the overall MSL organization.

Mark the box corresponding to the extent to which you agree or disagree with each of the values listed below as being characteristic of your work group under the *existing* organizational culture. Then estimate the percentage of people in your work group whose behavior generally reflects that value by placing a number from 1-100 in the corresponding blank.

Currently, in my work group, we value:	**Strongly Disagree**	**Disagree**	**Tend to Disagree**	**Tend to Agree**	**Agree**	**Strongly Agree**	**Percentage of people in your work group whose behavior generally reflects this value.**
1. flexibility	☐	☐	☐	☐	☐	☐	____%
2. adaptability	☐	☐	☐	☐	☐	☐	____%
3. stability	☐	☐	☐	☐	☐	☐	____%
4. predictability	☐	☐	☐	☐	☐	☐	____%
5. being innovative	☐	☐	☐	☐	☐	☐	____%
6. being quick to take advantage of opportunities	☐	☐	☐	☐	☐	☐	____%
7. being willing to experiment	☐	☐	☐	☐	☐	☐	____%
8. risk taking	☐	☐	☐	☐	☐	☐	____%
9. being careful	☐	☐	☐	☐	☐	☐	____%
10. being rule oriented	☐	☐	☐	☐	☐	☐	____%

Currently, in my work group, we value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percentage of people in your work group whose behavior generally reflects this value.
11. being analytical	☐	☐	☐	☐	☐	☐	____%
12. paying attention to detail	☐	☐	☐	☐	☐	☐	____%
13. being precise	☐	☐	☐	☐	☐	☐	____%
14. being team oriented	☐	☐	☐	☐	☐	☐	____%
15. sharing information freely	☐	☐	☐	☐	☐	☐	____%
16. emphasizing a single culture throughout the organization	☐	☐	☐	☐	☐	☐	____%
17. being people oriented	☐	☐	☐	☐	☐	☐	____%
18. being fair	☐	☐	☐	☐	☐	☐	____%
19. respecting the rights of individuals	☐	☐	☐	☐	☐	☐	____%
20. being tolerant	☐	☐	☐	☐	☐	☐	____%
21. being informal	☐	☐	☐	☐	☐	☐	____%
22. being easy going	☐	☐	☐	☐	☐	☐	____%
23. being calm	☐	☐	☐	☐	☐	☐	____%
24. being supportive	☐	☐	☐	☐	☐	☐	____%
25. being aggressive	☐	☐	☐	☐	☐	☐	____%
26. being decisive	☐	☐	☐	☐	☐	☐	____%
27. being action oriented	☐	☐	☐	☐	☐	☐	____%
28. taking initiative	☐	☐	☐	☐	☐	☐	____%
29. being reflective	☐	☐	☐	☐	☐	☐	____%
30. being achievement oriented	☐	☐	☐	☐	☐	☐	____%
31. being demanding	☐	☐	☐	☐	☐	☐	____%
32. taking individual responsibility	☐	☐	☐	☐	☐	☐	____%

2

Currently, in my work group, we value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percentage of people in your work group whose behavior generally reflects this value.
33. having high expectations for performance	☐	☐	☐	☐	☐	☐	____%
34. opportunities for professional growth	☐	☐	☐	☐	☐	☐	____%
35. high pay for good performance	☐	☐	☐	☐	☐	☐	____%
36. security of employment	☐	☐	☐	☐	☐	☐	____%
37. offering praise for good performance	☐	☐	☐	☐	☐	☐	____%
38. having low levels of conflict	☐	☐	☐	☐	☐	☐	____%
39. confronting conflict directly	☐	☐	☐	☐	☐	☐	____%
40. developing friends at work	☐	☐	☐	☐	☐	☐	____%
41. fitting in	☐	☐	☐	☐	☐	☐	____%
42. working in collaboration with others	☐	☐	☐	☐	☐	☐	____%
43. enthusiasm for the job	☐	☐	☐	☐	☐	☐	____%
44. working long hours	☐	☐	☐	☐	☐	☐	____%
45. not being constrained by many rules	☐	☐	☐	☐	☐	☐	____%
46. emphasizing quality	☐	☐	☐	☐	☐	☐	____%
47. being distinctive--different from others	☐	☐	☐	☐	☐	☐	____%
48. having a good reputation	☐	☐	☐	☐	☐	☐	____%
49. being socially responsible	☐	☐	☐	☐	☐	☐	____%
50. being results oriented	☐	☐	☐	☐	☐	☐	____%
51. having a clear guiding philosophy	☐	☐	☐	☐	☐	☐	____%
52. being competitive	☐	☐	☐	☐	☐	☐	____%
53. being highly organized	☐	☐	☐	☐	☐	☐	____%

Each of the following ten items represents events that could occur and have an effect on your work group. Evaluate the level of change your work group would experience if faced with the event by circling the appropriate response for each item.

54. Your work group experiences a significant loss of business to a competitor.
    Your work group would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

55. Ten new customers show a sudden interest in your work group.
    Your work group would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

56. A key customer is extremely unhappy with an output from your work group and complains to your organizations's top management.
    Your work group would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

57. A key customer is delighted with an output from your work group and sends a letter to your organization's top management expressing that delight.
    Your work group would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

58. A contract or grant funding 50% of your work group's budget is delayed three months for administrative reasons.
    Your work group would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

59. An affirmative action/equal opportunity lawsuit occurs outside your work group for a situation similar to one in your work group.
Your work group would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

60. The market for your work group's services triples because of a recent decision requiring those services in certain types of organizations for accreditation or to receive an official "seal of approval" (for example, organizations working with hazardous materials).
Your work group would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

61. The market for your work group's services decreases by 75% for three years because of hard economic times.
Your work group would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

62. The types of people essential to your work group's business are in short supply.
Your work group would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

63. Your work group receives a request from a customer for an intensive project differing drastically from what your work group typically has done.
Your work group would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

5

Mark the box corresponding to the extent to which you agree or disagree with each of the following items as desirable for your work group in an ideal culture.

In my work group, we should value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
64. flexibility	☐	☐	☐	☐	☐	☐
65. adaptability	☐	☐	☐	☐	☐	☐
66. stability	☐	☐	☐	☐	☐	☐
67. predictability	☐	☐	☐	☐	☐	☐
68. being innovative	☐	☐	☐	☐	☐	☐
69. being quick to take advantage of opportunities	☐	☐	☐	☐	☐	☐
70. being willing to experiment	☐	☐	☐	☐	☐	☐
71. risk taking	☐	☐	☐	☐	☐	☐
72. being careful	☐	☐	☐	☐	☐	☐
73. being rule oriented	☐	☐	☐	☐	☐	☐
74. being analytical	☐	☐	☐	☐	☐	☐
75. paying attention to detail	☐	☐	☐	☐	☐	☐
76. being precise	☐	☐	☐	☐	☐	☐
77. being team oriented	☐	☐	☐	☐	☐	☐
78. sharing information freely	☐	☐	☐	☐	☐	☐
79. emphasizing a single culture throughout the organization	☐	☐	☐	☐	☐	☐
80. being people oriented	☐	☐	☐	☐	☐	☐
81. being fair	☐	☐	☐	☐	☐	☐
82. respecting the rights of individuals	☐	☐	☐	☐	☐	☐
83. being tolerant	☐	☐	☐	☐	☐	☐
84. being informal	☐	☐	☐	☐	☐	☐
85. being easy going	☐	☐	☐	☐	☐	☐
86. being calm	☐	☐	☐	☐	☐	☐
87. being supportive	☐	☐	☐	☐	☐	☐
88. being aggressive	☐	☐	☐	☐	☐	☐
89. being decisive	☐	☐	☐	☐	☐	☐

6

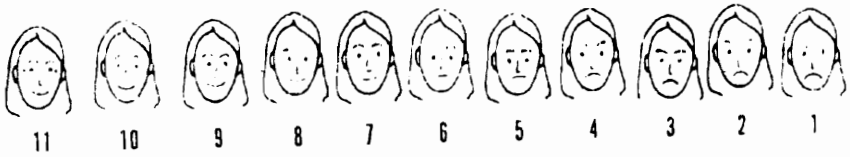
In my work group, we should value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
90. being action oriented	☐	☐	☐	☐	☐	☐
91. taking initiative	☐	☐	☐	☐	☐	☐
92. being reflective	☐	☐	☐	☐	☐	☐
93. being achievement oriented	☐	☐	☐	☐	☐	☐
94. being demanding	☐	☐	☐	☐	☐	☐
95. taking individual responsibility	☐	☐	☐	☐	☐	☐
96. having high expectations for performance	☐	☐	☐	☐	☐	☐
97. opportunities for professional growth	☐	☐	☐	☐	☐	☐
98. high pay for good performance	☐	☐	☐	☐	☐	☐
99. security of employment	☐	☐	☐	☐	☐	☐
100. offering praise for good performance	☐	☐	☐	☐	☐	☐
101. having low levels of conflict	☐	☐	☐	☐	☐	☐
102. confronting conflict directly	☐	☐	☐	☐	☐	☐
103. developing friends at work	☐	☐	☐	☐	☐	☐
104. fitting in	☐	☐	☐	☐	☐	☐
105. working in collaboration with others	☐	☐	☐	☐	☐	☐
106. enthusiasm for the job	☐	☐	☐	☐	☐	☐
107. working long hours	☐	☐	☐	☐	☐	☐
108. not being constrained by many rules	☐	☐	☐	☐	☐	☐
109. emphasizing quality	☐	☐	☐	☐	☐	☐
110. being distinctive--different from others	☐	☐	☐	☐	☐	☐
111. having a good reputation	☐	☐	☐	☐	☐	☐
112. being socially responsible	☐	☐	☐	☐	☐	☐
113. being results oriented	☐	☐	☐	☐	☐	☐
114. having a clear guiding philosophy	☐	☐	☐	☐	☐	☐
115. being competitive	☐	☐	☐	☐	☐	☐
116. being highly organized	☐	☐	☐	☐	☐	☐

The following items ask your opinions about your job and working at MSL. Please indicate your level of agreement or disagreement by checking the box corresponding to your level of agreement with the statement.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
117. If the values of my work group were different, I would not be associated with this work group.	☐	☐	☐	☐	☐	☐
118. Since joining my current work group, my personal values and those of the work group have become more similar.	☐	☐	☐	☐	☐	☐
119. I prefer my work group to other work groups because of what it stands for--its values.	☐	☐	☐	☐	☐	☐
120. My association with my work group is primarily based on the similarity of my values and those represented by the organization.	☐	☐	☐	☐	☐	☐
121. What my work group stands for is important to me.	☐	☐	☐	☐	☐	☐
122. I am proud to tell others I am a part of my current work group.	☐	☐	☐	☐	☐	☐
123. I talk up my work group to my friends as a great group to work for.	☐	☐	☐	☐	☐	☐
124. I feel a sense of "ownership" for my work group rather than just being an employee.	☐	☐	☐	☐	☐	☐
125. Unless I'm rewarded for it in some way I see no reason to expend extra effort on behalf of my work group.	☐	☐	☐	☐	☐	☐
126. How hard I work for my work group is directly linked to how much I'm rewarded.	☐	☐	☐	☐	☐	☐
127. My private views about my work group are different from those I express publicly.	☐	☐	☐	☐	☐	☐
128. In order for me to get rewarded around here, it's necessary for me to express the right attitude.	☐	☐	☐	☐	☐	☐

8

129. Please respond to the following faces scale by circling the face most representative of how you feel about your job at MSL.



The statements below concern common opinions people express about their work groups. Please indicate your level of agreement or disagreement with each statement with reference to your work group.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
130. My work group is close.	☐	☐	☐	☐	☐	☐
131. I trust my work group.	☐	☐	☐	☐	☐	☐
132. Members of my work group do not understand each other.	☐	☐	☐	☐	☐	☐
133. I distrust my work group.	☐	☐	☐	☐	☐	☐
134. I like my work group much more than other groups I have participated in.	☐	☐	☐	☐	☐	☐
135. I enjoy my work group.	☐	☐	☐	☐	☐	☐
136. I understand the people in my work group.	☐	☐	☐	☐	☐	☐
137. I dislike my work group.	☐	☐	☐	☐	☐	☐
138. I interact/communicate with my work group more than in most groups I have been in.	☐	☐	☐	☐	☐	☐
139. My work group is not very close at all.	☐	☐	☐	☐	☐	☐
140. The members of my work group share a lot in common.	☐	☐	☐	☐	☐	☐

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
141. Members of my work group do a lot of helpful things for each other.	☐	☐	☐	☐	☐	☐
142. I feel very close to my work group.	☐	☐	☐	☐	☐	☐
143. The work group members feel close to each other.	☐	☐	☐	☐	☐	☐
144. Members of my work group share some private ways of communicating with each other.	☐	☐	☐	☐	☐	☐
145. Our group relationship satisfies an important need for work group affiliation.	☐	☐	☐	☐	☐	☐
146. There is a great deal of hostility and aggression among membersof my work group.	☐	☐	☐	☐	☐	☐
147. I feel an interpersonal need for affiliation with my work group.	☐	☐	☐	☐	☐	☐

Thank you for taking time to fill out this survey.
Please return your completed survey to Larry Mallak.

10

Appendix G. MSL Prompter

Tuesday
To Do List:

** ☑ **Finish Larry's survey and return it to him.**

☐ Read signs on wall.

☑ Pour coffee in plant.

☐ Watch deer in field.

☐ Lament closing of Sycamore South.

Appendix H. MSL Intensity Data

1		The SAS System			1
				10:30 Friday, February 19, 19	
---------- WKGRP=A ----------					
Value	N	Mean	Std Dev		
Q12	7	5.8571	0.3780		
Q1	7	5.4286	0.5345		
Q5	7	5.4286	0.5345		
Q27	7	5.4286	0.5345		
Q9	7	5.4286	0.7868		
Q33	7	5.4286	0.7868	NUM(I)=	5.4898
Q46	7	5.4286	0.7868	I=	1.2203
Q13	7	5.2857	0.7559		
Q15	7	5.2857	1.1127		
Q32	7	5.1429	0.6901		
Q50	7	5.1429	0.6901		
Q53	7	5.1429	0.6901		
Q2	7	5.1429	0.8997		
Q26	7	5.0000	0.5774		
Q28	7	5.0000	0.8165		
Q6	7	5.0000	1.0000		
Q21	7	5.0000	1.0000		
Q42	7	5.0000	1.0000		
Q14	7	5.0000	1.4142		
Q48	7	4.8571	0.8997		
Q49	7	4.8571	0.8997		
Q17	7	4.8571	1.3452		
Q19	7	4.8571	1.4639		
Q40	7	4.7143	0.4880		
Q41	7	4.7143	0.4880		
Q18	7	4.7143	1.3801		
Q11	7	4.5714	0.9759		
Q45	7	4.4286	0.5345		
Q7	7	4.4286	0.9759		
Q20	7	4.4286	1.2724		
Q24	7	4.4286	1.2724		
Q30	7	4.4286	1.2724		
Q36	7	4.2857	0.7559		
Q52	7	4.2857	1.3801		
Q22	7	4.1429	1.2150		
Q43	7	4.1429	1.2150		
Q10	7	4.1429	1.5736		
Q44	7	4.1429	1.7728		
Q37	7	4.0000	2.0000		
Q8	7	3.8571	0.8997		
Q25	7	3.8571	1.0690		

Q38	7	3.8571	1.3452		
Q34	7	3.8571	1.4639		
Q29	7	3.7143	0.9512		
Q23	7	3.7143	1.3801		
Q16	7	3.7143	1.6036		
Q3	7	3.7143	1.7043		
Q31	7	3.5714	1.5119		
Q4	7	3.2857	1.3801		
Q47	7	3.1429	0.6901		
Q39	7	3.1429	1.2150		
Q51	7	3.0000	1.2910		
Q35	7	3.0000	1.5275		
---------- WKGRP=B ----------					
Variabl	N	Mean	Std Dev		
Q5	3	6.0000	0.0000		
Q11	3	5.6667	0.5774		
Q34	3	5.6667	0.5774		
Q46	3	5.6667	0.5774		
Q6	3	5.3333	0.5774		
Q7	3	5.3333	0.5774	NUM(I)=	5.5714
Q13	3	5.3333	0.5774	I=	1.2135
Q18	3	5.3333	0.5774		
Q19	3	5.3333	0.5774		
Q20	3	5.3333	0.5774		
Q21	3	5.3333	0.5774		
Q24	3	5.3333	0.5774		
Q30	3	5.3333	0.5774		
Q43	3	5.3333	0.5774		
Q35	3	5.3333	1.1547		
Q36	3	5.3333	1.1547		
Q12	3	5.0000	0.0000		
Q26	3	5.0000	0.0000		
Q28	3	5.0000	0.0000		
Q14	3	5.0000	1.0000		
Q22	3	5.0000	1.0000		
Q32	3	5.0000	1.0000		
Q39	3	5.0000	1.0000		
Q40	3	5.0000	1.0000		
Q45	3	5.0000	1.0000		
Q48	3	5.0000	1.0000		
Q50	3	5.0000	1.0000		
Q2	3	4.6667	0.5774		
Q3	3	4.6667	0.5774		
Q15	3	4.6667	0.5774		
Q27	3	4.6667	0.5774		

Q42	3	4.6667	0.5774		
Q23	3	4.6667	1.1547		
Q33	3	4.6667	1.1547		
Q1	3	4.3333	0.5774		
Q25	3	4.3333	0.5774		
Q38	3	4.3333	0.5774		
Q4	3	4.3333	2.0817		
Q8	3	4.0000	0.0000		
Q17	3	4.0000	0.0000		
Q37	3	4.0000	1.7321		
Q9	3	3.6667	0.5774		
Q29	3	3.6667	0.5774		
Q49	3	3.6667	0.5774		
Q41	3	3.6667	1.5275		
Q44	3	3.3333	0.5774		
Q53	3	3.3333	1.1547		
Q31	3	3.3333	1.5275		
Q10	3	3.3333	2.5166		
Q16	3	3.0000	1.0000		
Q47	3	3.0000	1.0000		
Q51	3	3.0000	1.0000		
Q52	3	2.3333	1.1547		
---------- WKGRP=C ----------					
Variabl	N	Mean	Std Dev		
Q42	8	5.6250	0.5175		
Q12	8	5.5000	0.5345		
Q1	8	5.5000	0.7559		
Q2	8	5.5000	0.7559		
Q13	8	5.5000	0.7559		
Q21	8	5.5000	0.7559	NUM(I)=	5.5
Q46	8	5.3750	0.5175	I=	1.1984
Q6	8	5.3750	0.7440		
Q24	8	5.3750	0.7440		
Q33	8	5.3750	0.7440		
Q14	8	5.3750	1.0607		
Q17	8	5.2500	0.7071		
Q22	8	5.2500	0.8864		
Q40	8	5.2500	0.8864		
Q48	8	5.1250	0.8345		
Q20	8	5.0000	0.9258		
Q19	8	5.0000	1.4142		
Q5	8	5.0000	1.6903		
Q27	8	4.8750	0.9910		
Q15	8	4.8750	1.3562		
Q18	8	4.8750	1.4577		

Q26	8	4.7500	0.8864		
Q47	8	4.7500	1.0351		
Q32	8	4.7500	1.2817		
Q28	8	4.7500	1.4880		
Q9	8	4.6250	1.0607		
Q25	8	4.6250	1.0607		
Q38	8	4.6250	1.0607		
Q49	8	4.6250	1.0607		
Q37	8	4.6250	1.3025		
Q45	8	4.5000	0.9258		
Q30	8	4.5000	1.3093		
Q43	8	4.5000	1.4142		
Q50	8	4.3750	1.1877		
Q39	8	4.3750	1.3025		
Q16	8	4.3750	1.9226		
Q7	8	4.2500	0.8864		
Q23	8	4.2500	1.3887		
Q44	8	4.2500	1.3887		
Q53	8	4.2500	1.3887		
Q3	8	4.2500	1.4880		
Q36	8	4.2500	1.9086		
Q11	8	4.1250	0.8345		
Q51	8	4.0000	1.6903		
Q8	8	3.8750	1.1260		
Q41	8	3.8750	1.4577		
Q34	8	3.8750	1.6421		
Q29	8	3.7500	1.4880		
Q35	8	3.3750	1.5059		
Q4	8	3.2500	1.6690		
Q10	8	3.0000	0.7559		
Q31	8	3.0000	1.1952		
Q52	8	2.3750	1.1877		
---------- WKGRP=D ----------					
Variabl	N	Mean	Std Dev		
Q19	3	5.6667	0.5774		
Q9	3	5.3333	0.5774		
Q18	3	5.3333	0.5774		
Q20	3	5.3333	0.5774		
Q14	3	5.3333	1.1547		
Q48	3	5.3333	1.1547	NUM(I)=	5.381
Q49	3	5.3333	1.1547	I=	1.1899
Q10	3	5.0000	0.0000		
Q31	3	5.0000	0.0000		
Q1	3	5.0000	1.0000		
Q2	3	5.0000	1.0000		

Q3	3	5.0000	1.0000		
Q12	3	5.0000	1.0000		
Q24	3	5.0000	1.0000		
Q32	3	5.0000	1.0000		
Q33	3	5.0000	1.0000		
Q42	3	5.0000	1.0000		
Q46	3	5.0000	1.0000		
Q4	3	4.6667	0.5774		
Q5	3	4.6667	0.5774		
Q17	3	4.6667	0.5774		
Q30	3	4.6667	0.5774		
Q40	3	4.6667	0.5774		
Q50	3	4.6667	0.5774		
Q13	3	4.6667	1.1547		
Q28	3	4.6667	1.1547		
Q37	3	4.6667	1.1547		
Q38	3	4.6667	1.1547		
Q6	3	4.3333	0.5774		
Q11	3	4.3333	0.5774		
Q21	3	4.3333	0.5774		
Q22	3	4.3333	0.5774		
Q23	3	4.3333	0.5774		
Q27	3	4.3333	0.5774		
Q43	3	4.3333	0.5774		
Q34	3	4.3333	1.1547		
Q44	3	4.3333	1.1547		
Q16	3	4.3333	1.5275		
Q36	3	4.3333	1.5275		
Q51	3	4.3333	1.5275		
Q7	3	4.0000	0.0000		
Q15	3	4.0000	0.0000		
Q35	3	4.0000	0.0000		
Q8	3	4.0000	1.0000		
Q41	3	4.0000	1.0000		
Q53	3	4.0000	2.0000		
Q26	3	3.6667	0.5774		
Q29	3	3.6667	0.5774		
Q39	3	3.6667	0.5774		
Q47	3	3.6667	0.5774		
Q45	3	3.3333	0.5774		
Q52	3	3.3333	0.5774		
Q25	3	3.0000	1.0000		

WKGRP=E					
Variabl	N	Mean	Std Dev		
Q12	4	5.2500	0.9574		
Q9	4	5.0000	0.0000		
Q48	4	5.0000	0.0000		
Q10	4	5.0000	0.8165		
Q44	4	4.7500	0.5000		
Q32	4	4.7500	0.9574	NUM(I)=	4.9286
Q50	4	4.7500	1.8930	I=	1.4268
Q11	4	4.5000	0.5774		
Q13	4	4.2500	0.9574		
Q40	4	4.2500	0.9574		
Q31	4	4.2500	1.2583		
Q42	4	4.2500	1.2583		
Q2	4	4.0000	0.8165		
Q33	4	4.0000	1.4142		
Q25	4	4.0000	1.6330		
Q21	4	4.0000	2.0000		
Q41	4	3.7500	0.5000		
Q1	4	3.7500	1.2583		
Q14	4	3.7500	1.2583		
Q49	4	3.7500	1.2583		
Q36	4	3.7500	1.5000		
Q28	4	3.7500	2.6300		
Q38	4	3.5000	0.5774		
Q45	4	3.5000	1.0000		
Q53	4	3.5000	1.2910		
Q27	4	3.5000	1.7321		
Q30	4	3.5000	1.7321		
Q47	3	3.3333	0.5774		
Q4	4	3.2500	1.2583		
Q5	4	3.2500	1.7078		
Q20	4	3.2500	1.7078		
Q22	4	3.2500	2.0616		
Q23	4	3.2500	2.0616		
Q46	4	3.0000	1.4142		
Q52	4	3.0000	1.4142		
Q15	4	3.0000	1.8257		
Q26	4	3.0000	1.8257		
Q51	4	3.0000	1.8257		
Q39	4	2.7500	0.9574		
Q16	4	2.7500	1.5000		
Q37	4	2.7500	1.5000		
Q3	4	2.7500	1.7078		
Q7	4	2.7500	1.7078		
Q19	4	2.7500	1.7078		

Q43	4	2.7500	1.7078		
Q24	4	2.7500	2.0616		
Q17	4	2.5000	1.9149		
Q18	4	2.5000	1.9149		
Q29	4	2.2500	0.9574		
Q8	4	2.2500	1.5000		
Q34	4	2.0000	1.4142		
Q6	4	1.7500	0.5000		
Q35	4	1.2500	0.5000		
---------- WKGRP=F ----------					
Variabl	N	Mean	Std Dev		
Q12	7	5.5714	0.5345		
Q2	7	5.1429	0.6901		
Q5	7	5.1429	0.6901		
Q6	7	5.1429	0.6901		
Q46	7	5.1429	0.8997		
Q28	7	4.8571	0.3780	NUM(I)=	5.1224
Q50	7	4.8571	0.6901	I=	1.2437
Q13	7	4.8571	0.8997		
Q21	7	4.7143	0.4880		
Q1	7	4.7143	0.7559		
Q45	7	4.7143	0.7559		
Q32	7	4.5714	0.5345		
Q11	7	4.5714	1.1339		
Q48	7	4.5714	1.3973		
Q27	7	4.4286	0.7868		
Q33	7	4.4286	0.7868		
Q14	7	4.4286	0.9759		
Q30	7	4.4286	1.2724		
Q42	7	4.2857	0.4880		
Q38	7	4.2857	0.7559		
Q43	7	4.2857	0.7559		
Q7	7	4.2857	0.9512		
Q9	7	4.2857	0.9512		
Q26	7	4.2857	0.9512		
Q20	7	4.2857	1.1127		
Q44	7	4.2857	1.1127		
Q19	7	4.1429	0.6901		
Q23	7	4.1429	0.6901		
Q40	7	4.1429	0.6901		
Q22	7	4.0000	0.8165		
Q36	7	4.0000	0.8165		
Q18	7	4.0000	1.0000		
Q47	7	4.0000	1.0000		
Q37	7	3.8571	0.6901		

Q29	7	3.8571	1.0690		
Q31	7	3.8571	1.0690		
Q24	7	3.8571	1.3452		
Q8	7	3.7143	0.7559		
Q39	7	3.7143	0.7559		
Q4	7	3.7143	1.3801		
Q15	7	3.5714	0.7868		
Q25	7	3.5714	0.9759		
Q41	7	3.5714	1.1339		
Q3	7	3.5714	1.2724		
Q53	7	3.4286	0.5345		
Q51	7	3.4286	0.9759		
Q49	7	3.4286	1.1339		
Q34	7	3.4286	1.5119		
Q10	7	3.1429	0.6901		
Q17	7	3.1429	0.6901		
Q16	7	3.0000	1.1547		
Q52	7	2.7143	1.2536		
Q35	7	2.7143	1.4960		
1			The SAS System		8
				10:30 Friday, February 19, 19	
---------- WKGRP=G ----------					
Variabl	N	Mean	Std Dev		
Q14	4	5.7500	0.5000		
Q36	4	5.7500	0.5000		
Q46	4	5.7500	0.5000		
Q49	4	5.7500	0.5000		
Q17	4	5.5000	0.5774		
Q19	4	5.5000	0.5774	NUM(I)=	5.6429
Q35	4	5.5000	0.5774	I=	1.1995
Q42	4	5.5000	0.5774		
Q12	4	5.2500	0.5000		
Q20	4	5.2500	0.9574		
Q21	4	5.2500	0.9574		
Q24	4	5.2500	0.5000		
Q28	4	5.2500	0.5000		
Q32	4	5.2500	0.5000		
Q34	4	5.2500	1.5000		
Q37	4	5.2500	0.9574		
Q40	4	5.2500	0.5000		
Q48	4	5.2500	0.5000		
Q6	4	5.0000	0.8165		
Q22	4	5.0000	1.1547		
Q27	4	5.0000	0.0000		
Q30	4	5.0000	0.0000		

Q33	4	5.0000	0.0000		
Q38	4	5.0000	0.8165		
Q43	4	5.0000	0.8165		
Q50	4	5.0000	0.8165		
Q1	4	4.7500	0.9574		
Q2	4	4.7500	0.5000		
Q15	4	4.7500	1.2583		
Q18	4	4.7500	0.5000		
Q26	4	4.7500	0.5000		
Q47	4	4.7500	0.5000		
Q5	4	4.5000	0.5774		
Q7	4	4.5000	0.5774		
Q9	4	4.5000	1.0000		
Q11	4	4.5000	0.5774		
Q13	4	4.5000	0.5774		
Q23	4	4.5000	1.0000		
Q29	4	4.5000	0.5774		
Q45	4	4.5000	0.5774		
Q8	4	4.2500	0.5000		
Q41	4	4.2500	0.9574		
Q3	4	4.0000	1.6330		
Q4	4	4.0000	0.8165		
Q16	4	4.0000	1.1547		
Q51	4	4.0000	0.8165		
Q10	4	3.7500	0.9574		
Q39	4	3.7500	0.9574		
Q53	4	3.5000	1.2910		
Q52	3	3.3333	1.5275		
Q25	4	3.2500	0.9574		
Q31	4	3.0000	1.6330		
Q44	4	2.2500	0.5000		
---------- WKGRP=H ----------					
Variabl	N	Mean	Std Dev		
Q10	7	4.7143	1.8898		
Q21	7	4.5714	1.1339		
Q13	7	4.5714	1.7182		
Q12	7	4.5714	1.8127		
Q31	7	4.4286	1.6183		
Q33	7	4.4286	1.6183	NUM(I)=	4.5102
Q1	7	4.2857	1.6036	I=	1.2199
Q46	7	4.2857	1.7043		
Q36	7	4.2857	1.8898		
Q48	7	4.2857	1.9760		
Q37	6	4.1667	1.3292		
Q4	7	4.1429	1.4639		

Q9	7	4.1429	1.5736		
Q22	7	4.1429	1.6762		
Q53	7	4.1429	1.9518		
Q11	7	4.0000	0.5774		
Q17	7	4.0000	1.5275		
Q50	7	4.0000	1.8257		
Q19	7	4.0000	1.9149		
Q2	7	3.8571	1.4639		
Q30	7	3.8571	1.5736		
Q18	7	3.8571	1.7728		
Q26	7	3.8571	1.7728		
Q42	7	3.8571	1.7728		
Q49	7	3.8571	1.7728		
Q3	7	3.7143	1.4960		
Q34	7	3.7143	1.7043		
Q27	7	3.7143	1.7995		
Q35	7	3.7143	1.7995		
Q32	7	3.7143	2.0587		
Q15	7	3.5714	1.3973		
Q41	7	3.5714	1.6183		
Q5	7	3.5714	1.7182		
Q20	7	3.5714	1.7182		
Q25	7	3.4286	1.2724		
Q47	7	3.4286	1.2724		
Q28	7	3.4286	1.7182		
Q16	7	3.2857	1.6036		
Q40	7	3.2857	1.6036		
Q14	7	3.2857	1.7995		
Q51	6	3.1667	1.3292		
Q24	7	3.1429	1.3452		
Q43	7	3.1429	1.3452		
Q45	7	3.1429	1.5736		
Q6	7	3.1429	1.6762		
Q29	7	3.1429	1.7728		
Q23	7	3.0000	1.1547		
Q52	7	3.0000	1.2910		
Q39	7	3.0000	1.5275		
Q7	7	3.0000	1.6330		
Q8	7	2.8571	1.5736		
Q44	7	2.5714	1.7182		
Q38	6	2.3333	1.3663		

Appendix I. MSL Core Values

1		The SAS System		1		
			23:49 Thursday, February 18, 1993			
Value	N	Mean	Std Dev	MCV		
12	43	5.3023	0.9395	74.30		
13	43	4.9302	1.0327	81.80		
21	43	4.8837	1.0284	82.49		
2	43	4.8140	1.0295	83.70		
33	43	4.8372	1.0675	84.09		
1	43	4.8140	1.0747	84.64		
46	43	4.9767	1.2245	84.89		
48	43	4.8605	1.1460	85.30		
42	43	4.7674	1.1305	86.64		
11	43	4.4419	0.8536	86.76		
9	43	4.6279	1.0696	87.94		
32	43	4.6977	1.1859	89.11		
50	43	4.6744	1.1695	89.20		
40	43	4.5116	1.0992	90.86		
27	43	4.5349	1.1822	92.22		
5	43	4.6977	1.3893	93.44		
14	43	4.6744	1.4095	94.33		
28	43	4.5581	1.3680	95.83		
26	43	4.3488	1.1929	96.41		
30	43	4.3953	1.2562	96.83		
20	43	4.4651	1.3336	97.05		
19	43	4.5814	1.4676	97.52		
22	43	4.3953	1.2936	97.68		
45	43	4.1628	1.0896	98.24		
49	43	4.3488	1.3072	99.04		
6	43	4.4651	1.4695	100.10		
36	43	4.3953	1.3997	100.10		
18	43	4.3721	1.4642	102.11		
15	43	4.2558	1.3468	102.14		
17	43	4.2791	1.4028	102.89		
24	43	4.3256	1.4593	103.09		
43	43	4.1163	1.3131	104.78		
7	43	4.0233	1.2438	105.48		
38	42	4.0238	1.2589	105.84		
37	42	4.1667	1.4128	105.91		
41	43	3.9302	1.1628	105.92		
47	42	3.8333	1.0801	106.44		
53	43	4.0233	1.3538	108.22		
25	43	3.8140	1.1393	108.53		
23	43	3.9070	1.2689	109.26		
10	43	3.9070	1.4279	113.33		
3	43	3.8837	1.4509	114.60		
8	43	3.5814	1.1595	116.14		
39	43	3.6279	1.2349	116.73		

31	43	3.7442	1.3817	117.03		
4	43	3.7209	1.3857	117.87		
29	43	3.5814	1.2389	118.36		
44	43	3.7674	1.4774	118.84		
34	43	3.8837	1.6360	119.37		
51	42	3.4762	1.3296	124.55		
16	43	3.5814	1.5155	126.08		
35	43	3.4419	1.6946	136.40		
52	42	3.0476	1.3243	141.89		

Appendix J. MSL Work Group Means

1 The SAS System 1

23:21 Thursday, March 25, 1993

---------- WKGRP=A ----------

Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	7	4.9107	0.3867	4.3750	5.3750
BEHAV	7	71.4825	11.0829	56.1321	87.7358
DBEHAV	7	82.9286	17.0630	50.0000	100.0000
CULTGAP	7	1.0538	0.5240	0.3208	1.9423
PERFRMCE	7	0.5974	0.4806	0.0000	1.3636
REFLPHL	7	1.9048	1.4105	0.0000	4.0000
JOB	7	1.7714	1.2189	0.4000	3.6000
CANONL	7	1.3674	0.7784	0.1424	2.4883
NCOM	7	3.5000	0.6208	2.6250	4.3750
ICOM	7	2.0000	0.4082	1.5000	2.5000
JOBSATIS	7	7.4286	1.9881	5.0000	11.0000
GROUP	7	4.2143	0.5076	3.4444	5.0000

---------- WKGRP=B ----------

Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	3	4.6667	0.5204	4.2500	5.2500
BEHAV	3	74.3711	8.6331	65.0943	82.1698
DBEHAV	3	87.5000	7.2169	83.3333	95.8333
CULTGAP	3	0.4906	0.1178	0.3585	0.5849
PERFRMCE	3	0.5455	0.2405	0.3636	0.8182
REFLPHL	3	0.8889	0.6939	0.3333	1.6667
JOB	3	0.4000	0.3464	0.2000	0.8000
CANONL	3	1.6824	0.5077	1.1034	2.0516
NCOM	3	4.2917	0.8509	3.6250	5.2500
ICOM	3	2.1667	0.5204	1.7500	2.7500
JOBSATIS	3	6.6667	4.0415	2.0000	9.0000
GROUP	3	4.5185	0.2103	4.2778	4.6667

---------- WKGRP=C----------

Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	8	4.9844	0.4745	4.2500	5.5000
BEHAV	8	68.8566	11.7015	54.6226	87.6667
DBEHAV	8	76.3542	19.2927	43.3333	100.0000
CULTGAP	8	0.8994	0.5126	0.2830	1.6792
PERFRMCE	8	0.5682	0.4950	0.0000	1.3636
REFLPHL	8	1.3750	1.3852	0.0000	3.3333
JOB	8	1.4750	1.2418	0.0000	3.8000
CANONL	8	1.4113	0.8546	-0.0307	2.3342
NCOM	8	4.3170	1.0093	2.7500	5.3750
ICOM	8	2.5313	1.0302	1.0000	3.7500
JOBSATIS	8	5.6250	2.9246	1.0000	9.0000
GROUP	8	4.4436	0.9669	2.7778	5.6667

WKGRP=D					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	3	4.5417	0.7108	3.7500	5.1250
BEHAV	3	75.5975	6.4747	68.3019	80.6604
DBEHAV	3	77.5000	10.1036	71.6667	89.1667
CULTGAP	3	1.0189	0.5073	0.6981	1.6038
PERFRMCE	3	0.7576	0.9972	0.1818	1.9091
REFLPHL	3	1.1111	0.7698	0.6667	2.0000
JOB	3	1.2000	0.5292	0.8000	1.8000
CANONL	3	1.6587	0.6349	0.9629	2.2067
NCOM	3	4.3333	0.1443	4.2500	4.5000
ICOM	3	3.1667	1.2829	1.7500	4.2500
JOBSATIS	3	7.3333	1.5275	6.0000	9.0000
GROUP	3	4.2778	0.8553	3.3333	5.0000

WKGRP=E					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	4	3.9063	0.6644	3.3750	4.7500
BEHAV	4	54.1179	7.3770	46.4151	64.0566
DBEHAV	4	44.0417	7.0951	38.3333	53.3333
CULTGAP	4	1.9090	0.7802	1.1321	2.7115
PERFRMCE	4	1.6136	0.8857	0.5455	2.5455
REFLPHL	4	2.3333	1.7847	0.3333	4.0000
JOB	4	2.4000	0.7118	1.6000	3.0000
CANONL	4	0.3085	0.7994	-0.4470	1.2665
NCOM	4	2.7500	0.4449	2.3750	3.3750
ICOM	4	2.6250	0.3227	2.2500	3.0000
JOBSATIS	4	3.7500	2.7538	1.0000	7.0000
GROUP	4	3.6250	0.9167	2.3333	4.2778

WKGRP=F					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	7	4.5000	0.4948	4.0000	5.2500
BEHAV	7	64.9576	8.6985	52.7358	78.7736
DBEHAV	7	67.9762	18.7507	33.3333	87.5000
CULTGAP	7	0.8113	0.3729	0.3208	1.4340
PERFRMCE	7	0.4545	0.2227	0.2727	0.9091
REFLPHL	7	0.6190	0.4484	0.0000	1.3333
JOB	7	1.2286	0.5823	0.4000	2.2000
CANONL	7	1.5490	0.2881	1.2220	1.9298
NCOM	7	3.6429	0.9394	2.5000	5.0000
ICOM	7	3.2143	1.1220	1.7500	5.2500
JOBSATIS	7	6.4286	1.9024	4.0000	9.0000
GROUP	7	3.8238	0.6320	2.6667	4.3889

WKGRP=G					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	4	4.7188	0.2772	4.3750	5.0000
BEHAV	4	75.0588	3.1936	71.8868	78.4615
DBEHAV	4	79.2500	6.9675	71.6667	88.3333
CULTGAP	4	0.5867	0.1793	0.4151	0.7925
PERFRMCE	4	0.4682	0.1778	0.2727	0.6364
REFLPHL	4	0.5000	0.4303	0.0000	1.0000
JOB	4	0.6250	0.1258	0.5000	0.8000
CANONL	4	1.8770	0.1447	1.6979	2.0338
NCOM	4	4.4688	0.3870	4.1250	5.0000
ICOM	4	2.1458	0.6884	1.3333	3.0000
JOBSATIS	4	8.5000	0.5774	8.0000	9.0000
GROUP	4	4.9028	0.3089	4.4444	5.1111
WKGRP=H					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	7	4.1250	1.3209	1.5000	5.3750
BEHAV	5	53.9547	27.5939	13.8302	91.1321
DBEHAV	5	51.3667	34.9041	1.8333	100.0000
CULTGAP	7	1.7147	1.0163	0.8679	3.6981
PERFRMCE	7	1.7042	1.4736	0.4545	4.4545
REFLPHL	7	2.0476	1.0440	0.3333	3.3333
JOB	7	1.6286	1.2352	0.2000	3.8000
CANONL	5	-0.0301	1.7454	-2.7003	1.8960
NCOM	7	3.6862	1.1131	1.7500	5.3750
ICOM	7	3.0238	0.3493	2.5000	3.5000
JOBSATIS	7	7.1429	0.8997	6.0000	8.0000
GROUP	7	3.3159	1.1545	1.2778	4.9444

Appendix K. Shenandoah Survey Instrument

Culture Survey

for

Shenandoah Life Insurance Company
Roanoke, VA
March 10-11, 1993

Before beginning this survey, please identify the Shenandoah division where you are employed by circling the number corresponding to your division.

1. **VP-Administration**

2. **President's Office**

3. **VP-Marketing**

4. **Investments**

5. **VP-Data Processing**

6. **VP-CFO**

7. **VP-Individual Insurance Services**

8. **VP-Group**

Next, please enter your two-digit cost center code. ☐☐

Please be sure to answer these items. If they are left blank, your responses to the rest of the survey will be unusable.

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

MSL
Management Systems Laboratories

Culture Survey

This survey seeks your perceptions of Shenandoah's culture as practiced in its divisions. The information you provide will be kept confidential. The information will be used to conduct research on organizational culture in general. The results will be reported in a Ph.D. dissertation. These results will be presented in a manner where no individuals can be identified. The goal of this survey is to provide information to support academic research.

Keep your Shenandoah division in mind when responding to the survey items. The focus of this survey is on the ***Shenandoah divisions*** and not the overall Shenandoah organization.

Mark the box corresponding to the extent to which you agree or disagree with each of the values listed below as being characteristic of your division under the *existing* organizational culture. Then estimate the percentage of people in your division whose behavior generally reflects that value by placing a number from 1-100 in the corresponding blank.

Currently, in my division, we value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percentage of people in your division whose behavior generally reflects this value.
1. flexibility	☐	☐	☐	☐	☐	☐	____%
2. adaptability	☐	☐	☐	☐	☐	☐	____%
3. stability	☐	☐	☐	☐	☐	☐	____%
4. predictability	☐	☐	☐	☐	☐	☐	____%
5. being innovative	☐	☐	☐	☐	☐	☐	____%
6. being quick to take advantage of opportunities	☐	☐	☐	☐	☐	☐	____%
7. being willing to experiment	☐	☐	☐	☐	☐	☐	____%
8. risk taking	☐	☐	☐	☐	☐	☐	____%
9. being careful	☐	☐	☐	☐	☐	☐	____%
10. being rule oriented	☐	☐	☐	☐	☐	☐	____%

2

Currently, in my division, we value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percentage of people in your division whose behavior generally reflects this value.
11. being analytical	☐	☐	☐	☐	☐	☐	____%
12. paying attention to detail	☐	☐	☐	☐	☐	☐	____%
13. being precise	☐	☐	☐	☐	☐	☐	____%
14. being team oriented	☐	☐	☐	☐	☐	☐	____%
15. sharing information freely	☐	☐	☐	☐	☐	☐	____%
16. emphasizing a single culture throughout the division	☐	☐	☐	☐	☐	☐	____%
17. being people oriented	☐	☐	☐	☐	☐	☐	____%
18. being fair	☐	☐	☐	☐	☐	☐	____%
19. respecting the rights of individuals	☐	☐	☐	☐	☐	☐	____%
20. being tolerant	☐	☐	☐	☐	☐	☐	____%
21. being informal	☐	☐	☐	☐	☐	☐	____%
22. being easy going	☐	☐	☐	☐	☐	☐	____%
23. being calm	☐	☐	☐	☐	☐	☐	____%
24. being supportive	☐	☐	☐	☐	☐	☐	____%
25. being aggressive	☐	☐	☐	☐	☐	☐	____%
26. being decisive	☐	☐	☐	☐	☐	☐	____%
27. being action oriented	☐	☐	☐	☐	☐	☐	____%
28. taking initiative	☐	☐	☐	☐	☐	☐	____%
29. being reflective	☐	☐	☐	☐	☐	☐	____%
30. being achievement oriented	☐	☐	☐	☐	☐	☐	____%
31. being demanding	☐	☐	☐	☐	☐	☐	____%
32. taking individual responsibility	☐	☐	☐	☐	☐	☐	____%

3

Currently, in my division, we value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree	Percentage of people in your division whose behavior generally reflects this value.
33. having high expectations for performance	☐	☐	☐	☐	☐	☐	____%
34. opportunities for professional growth	☐	☐	☐	☐	☐	☐	____%
35. high pay for good performance	☐	☐	☐	☐	☐	☐	____%
36. security of employment	☐	☐	☐	☐	☐	☐	____%
37. offering praise for good performance	☐	☐	☐	☐	☐	☐	____%
38. having low levels of conflict	☐	☐	☐	☐	☐	☐	____%
39. confronting conflict directly	☐	☐	☐	☐	☐	☐	____%
40. developing friends at work	☐	☐	☐	☐	☐	☐	____%
41. fitting in with each other	☐	☐	☐	☐	☐	☐	____%
42. working in collaboration with others	☐	☐	☐	☐	☐	☐	____%
43. enthusiasm for the job	☐	☐	☐	☐	☐	☐	____%
44. working long hours	☐	☐	☐	☐	☐	☐	____%
45. not being constrained by many rules	☐	☐	☐	☐	☐	☐	____%
46. emphasizing quality	☐	☐	☐	☐	☐	☐	____%
47. being distinctive--different from others	☐	☐	☐	☐	☐	☐	____%
48. having a good reputation	☐	☐	☐	☐	☐	☐	____%
49. being socially responsible	☐	☐	☐	☐	☐	☐	____%
50. being results oriented	☐	☐	☐	☐	☐	☐	____%
51. having a clear guiding philosophy	☐	☐	☐	☐	☐	☐	____%
52. being competitive	☐	☐	☐	☐	☐	☐	____%
53. being highly organized	☐	☐	☐	☐	☐	☐	____%

4

Each of the following ten items represents events that could occur and have an effect on your division. Evaluate the level of change your division would experience if faced with the event by circling the appropriate response for each item.

54. Your division experiences a significant loss of business to a competitor.
    Your division would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

55. Ten new customers show a sudden interest in your division.
    Your division would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

56. A key customer is extremely unhappy with an output from your division and complains to your organizations's top management.
    Your division would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

57. A key customer is delighted with an output from your division and sends a letter to your organization's top management expressing that delight.
    Your division would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

58. A contract funding 50% of your division's budget is delayed three months for administrative reasons.
    Your division would experience:
    a. little or no change
    b. mostly temporary change
    c. a mix of temporary and permanent change
    d. mostly permanent change
    e. survival-threatening change

5

59. An affirmative action/equal opportunity lawsuit occurs outside your division for a situation similar to one in your division.
Your division would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

60. The market for your division's services triples because of a recent decision requiring those services in certain types of organizations for accreditation or to receive an official "seal of approval" (for example, organizations working with hazardous materials).
Your division would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

61. The market for your division's services decreases by 75% for three years because of hard economic times.
Your division would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

62. The types of people essential to your division's business are in short supply.
Your division would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

63. Your division receives a request from a customer for an intensive project differing drastically from what your division typically has done.
Your division would experience:
a. little or no change
b. mostly temporary change
c. a mix of temporary and permanent change
d. mostly permanent change
e. survival-threatening change

Mark the box corresponding to the extent to which you agree or disagree with each of the following items as desirable for your division in an ideal culture.

In my division, we should value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
64. flexibility	☐	☐	☐	☐	☐	☐
65. adaptability	☐	☐	☐	☐	☐	☐
66. stability	☐	☐	☐	☐	☐	☐
67. predictability	☐	☐	☐	☐	☐	☐
68. being innovative	☐	☐	☐	☐	☐	☐
69. being quick to take advantage of opportunities	☐	☐	☐	☐	☐	☐
70. being willing to experiment	☐	☐	☐	☐	☐	☐
71. risk taking	☐	☐	☐	☐	☐	☐
72. being careful	☐	☐	☐	☐	☐	☐
73. being rule oriented	☐	☐	☐	☐	☐	☐
74. being analytical	☐	☐	☐	☐	☐	☐
75. paying attention to detail	☐	☐	☐	☐	☐	☐
76. being precise	☐	☐	☐	☐	☐	☐
77. being team oriented	☐	☐	☐	☐	☐	☐
78. sharing information freely	☐	☐	☐	☐	☐	☐
79. emphasizing a single culture throughout the division	☐	☐	☐	☐	☐	☐
80. being people oriented	☐	☐	☐	☐	☐	☐
81. being fair	☐	☐	☐	☐	☐	☐
82. respecting the rights of individuals	☐	☐	☐	☐	☐	☐
83. being tolerant	☐	☐	☐	☐	☐	☐
84. being informal	☐	☐	☐	☐	☐	☐
85. being easy going	☐	☐	☐	☐	☐	☐
86. being calm	☐	☐	☐	☐	☐	☐
87. being supportive	☐	☐	☐	☐	☐	☐
88. being aggressive	☐	☐	☐	☐	☐	☐
89. being decisive	☐	☐	☐	☐	☐	☐

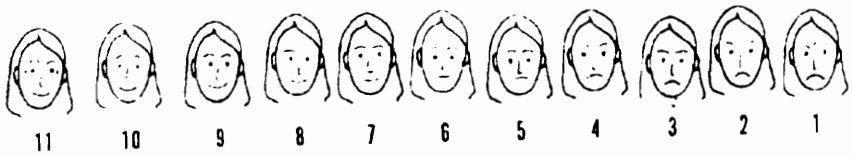
In my division, we should value:	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
90. being action oriented	☐	☐	☐	☐	☐	☐
91. taking initiative	☐	☐	☐	☐	☐	☐
92. being reflective	☐	☐	☐	☐	☐	☐
93. being achievement oriented	☐	☐	☐	☐	☐	☐
94. being demanding	☐	☐	☐	☐	☐	☐
95. taking individual responsibility	☐	☐	☐	☐	☐	☐
96. having high expectations for performance	☐	☐	☐	☐	☐	☐
97. opportunities for professional growth	☐	☐	☐	☐	☐	☐
98. high pay for good performance	☐	☐	☐	☐	☐	☐
99. security of employment	☐	☐	☐	☐	☐	☐
100. offering praise for good performance	☐	☐	☐	☐	☐	☐
101. having low levels of conflict	☐	☐	☐	☐	☐	☐
102. confronting conflict directly	☐	☐	☐	☐	☐	☐
103. developing friends at work	☐	☐	☐	☐	☐	☐
104. fitting in with each other	☐	☐	☐	☐	☐	☐
105. working in collaboration with others	☐	☐	☐	☐	☐	☐
106. enthusiasm for the job	☐	☐	☐	☐	☐	☐
107. working long hours	☐	☐	☐	☐	☐	☐
108. not being constrained by many rules	☐	☐	☐	☐	☐	☐
109. emphasizing quality	☐	☐	☐	☐	☐	☐
110. being distinctive--different from others	☐	☐	☐	☐	☐	☐
111. having a good reputation	☐	☐	☐	☐	☐	☐
112. being socially responsible	☐	☐	☐	☐	☐	☐
113. being results oriented	☐	☐	☐	☐	☐	☐
114. having a clear guiding philosophy	☐	☐	☐	☐	☐	☐
115. being competitive	☐	☐	☐	☐	☐	☐
116. being highly organized	☐	☐	☐	☐	☐	☐

8

The following items ask your opinions about your job and working in your division. Please indicate your level of agreement or disagreement by checking the box corresponding to your level of agreement with the statement.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
117. If the values of my division were different, I would not be associated with this division.	☐	☐	☐	☐	☐	☐
118. Since joining my current division, my personal values and those of the division have become more similar.	☐	☐	☐	☐	☐	☐
119. I prefer my division to other divisions because of what it stands for--its values.	☐	☐	☐	☐	☐	☐
120. My association with my division is primarily based on the similarity of my values and those represented by my division.	☐	☐	☐	☐	☐	☐
121. What my division stands for is important to me.	☐	☐	☐	☐	☐	☐
122. I am proud to tell others I am a part of my current division.	☐	☐	☐	☐	☐	☐
123. I talk up my division to my friends as a great group to work for.	☐	☐	☐	☐	☐	☐
124. I feel a sense of "ownership" for my division rather than just being an employee.	☐	☐	☐	☐	☐	☐
125. Unless I'm rewarded for it in some way I see no reason to expend extra effort on behalf of my division.	☐	☐	☐	☐	☐	☐
126. How hard I work for my division is directly linked to how much I'm rewarded.	☐	☐	☐	☐	☐	☐
127. My private views about my division are different from those I express publicly.	☐	☐	☐	☐	☐	☐
128. To get rewarded around here, it's necessary for me to express the right attitude.	☐	☐	☐	☐	☐	☐

129. Please respond to the following faces scale by circling the face most representative of how you feel about your job.



The statements below concern common opinions people express about their divisions. Please indicate your level of agreement or disagreement with each statement with reference to your division.

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
130. My division is close.	☐	☐	☐	☐	☐	☐
131. I trust my division.	☐	☐	☐	☐	☐	☐
132. Members of my division do not understand each other.	☐	☐	☐	☐	☐	☐
133. I distrust my division.	☐	☐	☐	☐	☐	☐
134. I like my division much more than other groups I have participated in.	☐	☐	☐	☐	☐	☐
135. I enjoy my division.	☐	☐	☐	☐	☐	☐
136. I understand the people in my division.	☐	☐	☐	☐	☐	☐
137. I dislike my division.	☐	☐	☐	☐	☐	☐
138. I interact/communicate with my division more than in most groups I have been in.	☐	☐	☐	☐	☐	☐
139. My division is not very close at all.	☐	☐	☐	☐	☐	☐
140. The members of my division share a lot in common.	☐	☐	☐	☐	☐	☐

10

	Strongly Disagree	Disagree	Tend to Disagree	Tend to Agree	Agree	Strongly Agree
141. Members of my division do helpful things for each other.	☐	☐	☐	☐	☐	☐
142. I feel close to my division.	☐	☐	☐	☐	☐	☐
143. The division members feel close to each other.	☐	☐	☐	☐	☐	☐
144. Members of my division share some private ways of communicating with each other.	☐	☐	☐	☐	☐	☐
145. My division satisfies an important need for affiliation.	☐	☐	☐	☐	☐	☐
146. Members of my division exhibit hostility and aggression among themselves.	☐	☐	☐	☐	☐	☐
147. I feel an interpersonal need for affiliation with my division.	☐	☐	☐	☐	☐	☐

Thank you for taking time to fill out this survey.

11

Appendix L. Shenandoah Memo

CULTURE SURVEY

LARGE CONFERENCE ROOM

WEDNESDAY, MARCH 10

Harold Kurstedt and Larry Mallak are developing a process for measuring culture strength in organizations and have asked us to participate in a research project.

Each employee will be asked to complete a survey of approximately 150 questions. Larry will distribute and collect the surveys. All responses will be confidential. Reports will deal with culture at the departmental level and at the company level.

The survey will be completed in the Large Conference Room according to the following schedule:

8:30 – 9:30	A – B
9:30 – 10:30	C – G
10:30 – 11:30	H – I
12:30 – 1:30	J – L
1:30 – 2:30	M – P
2:30 – 3:30	R – S
3:30 – 4:30	T – Y

A make–up session will be held on Thursday, March 11 at 9:00 a.m. in the large conference room for those who are unable to attend on Wednesday.

This should be a fun project. We appreciate your participation. The survey should be finished in 30 – 40 minutes.

Appendix M. Shenandoah Script

Shenandoah Survey Administration

March 10 & 11, 1993

Good morning/afternoon! (Welcoming words) I'm Larry Mallak from Virginia Tech. I work with Dr. Harold Kurstedt on researching organizations. We're grateful to you for providing us a real-world organization in which to test our ideas. The results from the surveys you'll be filling out shortly will help us learn more about the role of culture here at Shenandoah Life and for organizations in general.

There is no place to put your name on the survey and I ask that you do not identify yourself. Your responses are confidential. The results will be reported in a doctoral disseration in aggregate form so no individuals can be identified. I'll also provide a report to your organization once I've completed the research. The only demographic information I request is your divisional membership and your two-digit cost center code.

(Pass out surveys.)

When you receive your survey, please fill out the two items on the cover page. First, circle the number corresponding to the division where you are employed. Second, enter your two-digit cost center code in the boxes provided. Please be sure to respond to these two items or the rest of the survey will be unusable. *(Added after first session: VP-Group is Individual Marketing and VP-CFO is planning and control.)*

Please keep your Shenandoah division, rather than the entire organization, in mind when responding to the items on this survey.

Now, let me walk you through the survey briefly. You'll then have the balance of the hour to use in filling out the survey at your own pace.

The first 53 items require two responses each. Along the leftmost column you'll see a listing of 53 values commonly found in organizations. Please indicate your level of agreement or disagreement with each of the items as currently practiced ***within your division***. Then, indicate the percentage of people in your division whose behavior generally reflects each of the listed values. I recommend you first indicate your extent of agreement for all 53 items and then come back and put in the percentages. Use a number between 1 and 100 for the percentages. For example, if you have 10 people in your division and you feel 8 of them generally reflect the value of flexibility, put 80% in the blank corresponding to flexibility. Your numbers don't have to be exact—don't use a calculator—but please think through your answer carefully.

On pages 5 and 6, you'll find ten items where you should circle the response corresponding to the type of change most likely to occur in your division. These are hypothetical situations—please indicate what you think would happen in each scenario.

On pages 7 and 8 you'll find the same set of 53 values repeated. This time, however, you should mark your extent of agreement with these values as part of your division's desired culture—what you feel your division should value.

On pages 9-11, again please indicate your extent of agreement with each of the items. Item 129 (the faces scale) asks you to circle the face most representative of how you feel about your job within your division.

This survey will require 30 minutes, on average, to complete. Some of you may finish earlier and some may take longer. Please work at your own pace and provide thoughtful answers.

In an effort to keep research conditions the same for all 10 groups, I'll only be answering general questions about the survey. If you have difficulty with a particular item, try to give the best answer you can and go on.

This instrument has been pre-tested with a smaller organization and the known bugs have been worked out. However, you may find new bugs in the survey. You may either wish to make a note on your survey or share the comment with me when you turn in your completed survey.

Are there any questions?

Go ahead now and begin filling out the survey. It's (time) and we have until (time). When you're finished, please turn your survey in to me. I appreciate your participation and am grateful for the time you're taking out of your day to help.

Appendix N. Shenandoah Intensity Data

1		The SAS System			1
			18:26 Friday, March 12, 1993		
---------- DIV=S ----------					
Variable	N	Mean	Std Dev		
Q12	10	5.3000	0.4830		
Q13	10	5.3000	0.4830		
Q46	10	5.3000	0.4830		
Q48	10	5.3000	0.4830		
Q10	10	5.2000	0.6325		
Q11	10	5.2000	0.6325		
Q3	10	5.1000	0.5676	Num(I)=	5.225
Q9	10	5.1000	0.5676	I=	1.1655
Q33	10	5.1000	0.7379		
Q42	10	5.1000	0.5676		
Q50	10	5.1000	0.5676		
Q53	10	5.1000	0.5676		
Q40	10	5.0000	0.6667		
Q19	10	4.9000	0.7379		
Q41	10	4.9000	0.7379		
Q49	10	4.9000	0.5676		
Q17	10	4.8000	0.7888		
Q32	10	4.8000	1.0328		
Q21	10	4.7000	0.4830		
Q24	10	4.7000	1.4181		
Q26	10	4.7000	0.8233		
Q37	10	4.7000	0.4830		
Q18	10	4.6000	0.8433		
Q27	10	4.6000	0.6992		
Q43	10	4.6000	0.6992		
Q1	10	4.5000	0.7071		
Q2	10	4.5000	0.7071		
Q28	10	4.5000	0.9718		
Q30	10	4.5000	0.9718		
Q20	10	4.4000	1.3499		
Q23	10	4.4000	1.2649		
Q51	10	4.4000	1.3499		
Q7	10	4.3000	1.0593		
Q14	10	4.3000	1.3375		
Q22	10	4.3000	1.2517		
Q29	10	4.3000	0.8233		
Q36	10	4.3000	1.1595		
Q4	10	4.2000	1.1353		
Q5	10	4.2000	1.1353		
Q15	10	4.1000	1.6633		
Q16	10	4.1000	0.5676		

Q34	10	4.1000	0.9944		
Q38	10	4.1000	1.4491		
Q6	10	4.0000	1.2472		
Q35	10	4.0000	1.3333		
Q44	10	4.0000	1.6330		
Q39	10	3.9000	1.1972		
Q45	10	3.9000	0.8756		
Q47	10	3.6000	1.0750		
Q8	10	3.2000	1.2293		
Q31	10	3.2000	1.4757		
Q52	10	3.2000	1.3166		
Q25	10	3.0000	1.3333		
---------- DIV=T ----------					
Variable	N	Mean	Std Dev		
Q14	45	5.2000	1.1985		
Q48	44	5.0682	0.9976		
Q12	45	5.0667	0.9630		
Q46	45	5.0667	1.0091		
Q13	44	5.0455	0.9389		
Q9	45	5.0444	0.9282		
Q49	44	4.8864	0.8413	Num(I)=	5.0306
Q33	45	4.8667	1.1794	I=	1.1533
Q50	45	4.8667	0.8944		
Q32	45	4.8222	1.0721		
Q3	45	4.8000	0.9195		
Q15	45	4.7333	1.3551		
Q41	45	4.7111	1.0362		
Q40	45	4.6889	1.0406		
Q10	44	4.6364	0.7803		
Q28	45	4.6222	1.1734		
Q2	45	4.5778	1.1578		
Q20	45	4.5778	1.1380		
Q21	45	4.5778	0.9883		
Q24	45	4.5778	1.2338		
Q42	45	4.5778	1.0333		
Q53	45	4.5556	1.0347		
Q19	45	4.5333	1.4078		
Q23	45	4.5333	1.1402		
Q17	44	4.5227	1.3205		
Q27	44	4.5227	0.9997		
Q22	45	4.5111	1.0140		
Q29	44	4.5000	0.9765		
Q1	45	4.4889	1.3420		
Q18	45	4.4222	1.4998		
Q30	45	4.3778	1.1340		
Q5	43	4.3488	1.0665		

Q11	45	4.3333	1.0000		
Q26	45	4.3111	1.0834		
Q38	45	4.3111	1.1042		
Q4	45	4.2667	0.8893		
Q51	43	4.2326	1.1092		
Q7	45	4.2000	1.0574		
Q16	43	4.1860	1.2003		
Q6	45	4.1778	0.9364		
Q43	45	4.0444	1.1472		
Q52	44	4.0000	1.0997		
Q37	45	3.9333	1.5136		
Q45	45	3.8889	1.5407		
Q36	45	3.7778	1.4754		
Q25	44	3.6591	1.1603		
Q47	44	3.6364	1.2217		
Q31	45	3.6000	1.2505		
Q39	45	3.4667	1.4709		
Q35	45	3.3333	1.5954		
Q8	45	3.2889	1.1989		
Q44	45	3.1111	1.4337		
Q34	45	3.0889	1.4432		
---------- DIV=U ----------					
Variable	N	Mean	Std Dev		
Q11	33	5.3636	0.6528		
Q33	34	5.2941	0.6291		
Q46	34	5.2647	0.7511		
Q12	33	5.2424	0.7918		
Q14	33	5.2424	0.8671		
Q50	34	5.1765	0.7165		
Q13	33	5.0909	0.8790	Num(I)=	5.2204
Q2	34	5.0882	0.8300	I=	1.1672
Q9	34	5.0588	0.6937		
Q5	34	4.9706	0.9040		
Q49	34	4.9412	0.8507		
Q1	34	4.9118	0.7927		
Q42	34	4.9118	0.8300		
Q48	34	4.8824	0.9775		
Q15	33	4.8788	1.0234		
Q32	33	4.8788	0.7809		
Q27	33	4.8182	0.8083		
Q24	33	4.7576	0.9364		
Q41	34	4.7353	0.9632		
Q30	33	4.6970	0.8833		
Q28	33	4.6667	1.0508		
Q19	32	4.6563	1.0957		
Q26	33	4.6061	0.9334		

Q3	34	4.5882	0.9250		
Q7	34	4.5588	1.1597		
Q40	34	4.5588	0.9906		
Q6	34	4.5000	1.0225		
Q17	33	4.4848	0.9395		
Q20	33	4.4848	0.6185		
Q53	34	4.4412	0.9274		
Q21	33	4.4242	0.9024		
Q38	34	4.3529	1.2999		
Q4	33	4.3333	0.8165		
Q10	34	4.3235	1.0067		
Q18	33	4.2424	1.2255		
Q22	33	4.2424	1.0009		
Q23	33	4.1818	0.9170		
Q29	33	4.1515	0.7124		
Q43	34	4.1471	1.1046		
Q51	34	4.1471	1.3288		
Q52	34	4.0588	1.0133		
Q39	34	4.0000	1.1807		
Q45	34	4.0000	1.1547		
Q37	33	3.9697	1.2621		
Q25	33	3.9091	1.0417		
Q31	33	3.9091	1.0713		
Q44	34	3.8235	1.6417		
Q16	33	3.8182	1.1027		
Q47	33	3.6667	1.0801		
Q8	34	3.5000	1.2123		
Q34	34	3.4118	1.6352		
Q36	34	3.4118	1.5397		
Q35	34	3.2647	1.6201		
---------- DIV=V ----------					
Variable	N	Mean	Std Dev		
Q46	9	5.5556	0.7265		
Q12	9	5.4444	0.7265		
Q9	9	5.3333	1.0000		
Q13	9	5.3333	0.7071		
Q48	9	5.3333	0.7071		
Q1	9	5.2222	0.8333		
Q33	9	5.2222	0.4410	Num(I)=	5.3194
Q3	9	5.1111	0.7817	I=	1.1769
Q32	9	5.1111	0.7817		
Q11	9	5.0000	0.8660		
Q50	9	5.0000	0.5000		
Q19	9	4.8889	0.7817		
Q4	9	4.7778	0.6667		
Q18	9	4.7778	0.6667		

Q20	9	4.7778	0.8333		
Q21	9	4.7778	0.9718		
Q24	9	4.7778	1.0929		
Q26	9	4.7778	0.8333		
Q36	9	4.7778	0.9718		
Q40	9	4.7778	0.6667		
Q41	9	4.7778	1.0929		
Q2	9	4.6667	0.7071		
Q10	9	4.6667	1.2247		
Q30	9	4.6667	0.7071		
Q37	9	4.6667	1.2247		
Q38	9	4.6667	1.1180		
Q43	9	4.6667	0.8660		
Q45	9	4.6667	0.7071		
Q49	9	4.6667	0.7071		
Q17	9	4.5556	1.0138		
Q22	9	4.5556	0.8819		
Q27	9	4.5556	0.7265		
Q28	9	4.5556	0.8819		
Q14	9	4.4444	1.5092		
Q5	9	4.3333	1.0000		
Q34	9	4.3333	1.1180		
Q42	9	4.3333	1.0000		
Q6	9	4.2222	0.9718		
Q39	9	4.2222	0.6667		
Q7	9	4.1111	0.9280		
Q23	9	4.1111	0.7817		
Q51	9	4.1111	1.0541		
Q8	9	4.0000	1.0000		
Q15	9	4.0000	1.7321		
Q29	9	4.0000	1.0000		
Q53	9	3.8889	1.6915		
Q31	9	3.6667	1.3229		
Q52	9	3.6667	1.0000		
Q25	9	3.5556	0.7265		
Q47	9	3.4444	1.5092		
Q16	9	3.3333	1.1180		
Q35	9	3.3333	1.5000		
Q44	9	3.3333	1.4142		

DIV=W					
Variable	N	Mean	Std Dev		
Q46	39	4.8462	0.9608		
Q14	39	4.7949	1.2178		
Q1	39	4.7692	0.9308		
Q2	39	4.7436	0.6774		
Q3	39	4.7179	0.7591		
Q48	39	4.7179	0.9986		
Q20	39	4.6923	0.7998	Num(I)=	4.7404
Q22	39	4.6410	0.8107	I=	1.1147
Q40	39	4.6410	0.7429		
Q21	39	4.6154	0.7819		
Q19	39	4.5897	0.8497		
Q49	39	4.5897	0.9380		
Q12	39	4.5641	0.8824		
Q13	39	4.5641	0.9402		
Q17	39	4.5641	0.9402		
Q50	39	4.5641	0.7879		
Q9	39	4.5385	0.8537		
Q23	39	4.5385	0.8537		
Q42	39	4.5385	0.9416		
Q24	39	4.5128	0.8545		
Q32	39	4.5128	0.9140		
Q41	39	4.5128	0.8231		
Q33	39	4.4615	1.1203		
Q4	39	4.3846	0.9629		
Q28	39	4.3846	0.9898		
Q29	39	4.3590	0.9028		
Q52	39	4.3590	0.9315		
Q27	39	4.3077	0.9221		
Q30	39	4.2821	0.9719		
Q38	39	4.2564	0.8801		
Q26	39	4.2308	0.9308		
Q53	39	4.2308	0.9308		
Q6	38	4.2105	1.1188		
Q18	39	4.1795	1.2952		
Q11	38	4.1579	1.0007		
Q5	39	4.1282	0.8938		
Q45	39	4.1282	1.1281		
Q15	39	4.1026	1.4653		
Q51	39	4.0769	0.8701		
Q43	39	4.0513	1.0500		
Q16	39	4.0000	1.0761		
Q36	39	3.9487	1.2967		
Q10	39	3.9231	1.1559		
Q47	39	3.9231	0.8701		
Q25	39	3.8974	1.0710		

Q31	39	3.7949	1.0558		
Q37	39	3.7179	1.3755		
Q7	39	3.6667	1.1082		
Q8	39	3.4872	1.1441		
Q39	39	3.3846	1.1611		
Q34	39	3.3590	1.1353		
Q35	39	3.2821	1.3562		
Q44	39	2.9487	1.4500		
---------- DIV=X ----------					
Variable	N	Mean	Std Dev		
Q46	11	5.0909	0.8312		
Q50	11	5.0909	0.7006		
Q1	12	5.0833	0.6686		
Q20	11	5.0000	0.6325		
Q2	12	4.9167	0.7930		
Q3	12	4.9167	0.6686		
Q5	12	4.9167	0.7930	Num(I)=	4.9915
Q12	12	4.9167	0.6686	I=	1.1428
Q48	11	4.9091	1.1362		
Q49	11	4.9091	0.9439		
Q6	12	4.8333	0.9374		
Q13	12	4.8333	0.7177		
Q19	12	4.8333	1.1146		
Q33	11	4.8182	1.4013		
Q11	12	4.7500	0.8660		
Q21	12	4.7500	0.7538		
Q32	12	4.7500	0.7538		
Q41	11	4.7273	0.7862		
Q9	12	4.6667	1.0731		
Q42	11	4.6364	0.6742		
Q10	12	4.5833	1.5643		
Q23	12	4.5833	0.6686		
Q40	11	4.5455	0.9342		
Q7	12	4.5000	1.1677		
Q14	12	4.5000	1.0871		
Q15	12	4.5000	1.0000		
Q22	12	4.5000	0.5222		
Q24	12	4.5000	1.0000		
Q16	12	4.4167	1.0836		
Q17	12	4.4167	1.2401		
Q30	12	4.4167	1.2401		
Q38	11	4.3636	0.5045		
Q18	12	4.3333	1.1547		
Q28	12	4.3333	1.0731		
Q39	11	4.2727	0.6467		
Q43	11	4.2727	1.0091		

Q31	12	4.1667	1.0299		
Q51	11	4.0909	1.3751		
Q53	11	4.0909	0.9439		
Q26	12	4.0833	1.0836		
Q29	12	4.0833	0.9003		
Q4	12	4.0000	1.4771		
Q27	12	4.0000	1.2792		
Q47	11	4.0000	1.0954		
Q52	11	4.0000	1.6125		
Q8	12	3.8333	1.4035		
Q44	11	3.6364	1.5015		
Q25	12	3.5833	1.1645		
Q37	11	3.4545	1.3685		
Q45	11	3.4545	1.1282		
Q35	11	3.0909	0.8312		
Q36	11	2.9091	1.3751		
Q34	11	2.6364	1.2863		
---------- DIV=Y ----------					
Variable	N	Mean	Std Dev		
Q46	15	4.8667	1.0601		
Q1	15	4.8000	1.2649		
Q19	15	4.8000	0.7746		
Q33	15	4.8000	1.0142		
Q30	15	4.7333	1.1629		
Q40	15	4.7333	1.0328		
Q48	15	4.7333	1.2228	Num(I)=	4.7667
Q21	15	4.6667	1.1751	I=	1.1374
Q22	15	4.6667	1.0465		
Q45	14	4.6429	0.9288		
Q17	15	4.6000	1.2984		
Q50	15	4.6000	1.2421		
Q49	15	4.5333	0.7432		
Q18	15	4.4667	0.9904		
Q20	15	4.4667	0.9155		
Q41	15	4.4667	1.1872		
Q42	15	4.4667	1.3558		
Q2	15	4.4000	1.2984		
Q3	15	4.4000	0.9103		
Q24	15	4.4000	1.0556		
Q43	15	4.4000	1.2421		
Q9	15	4.3333	0.8165		
Q14	15	4.3333	1.7593		
Q38	15	4.3333	1.2344		
Q47	15	4.3333	1.2910		
Q52	15	4.3333	1.3973		
Q5	15	4.2667	0.9612		

Q32	15	4.2000	1.3732		
Q4	15	4.1333	1.1872		
Q12	15	4.1333	1.4075		
Q29	15	4.1333	0.8338		
Q37	15	4.1333	1.2459		
Q39	15	4.1333	1.0601		
Q27	15	4.0667	1.5337		
Q6	15	4.0000	1.2536		
Q25	15	4.0000	1.2536		
Q53	15	3.9333	1.2799		
Q13	15	3.8667	1.0601		
Q15	15	3.8667	1.4573		
Q23	15	3.8667	0.8338		
Q28	15	3.8667	1.5055		
Q31	15	3.8667	1.1872		
Q16	15	3.8000	1.6125		
Q36	15	3.7333	1.3870		
Q44	15	3.7333	0.9612		
Q7	15	3.6667	1.2910		
Q26	15	3.6000	1.2984		
Q34	15	3.6000	1.5024		
Q10	15	3.5333	1.2459		
Q11	15	3.5333	0.9904		
Q8	15	3.4667	1.4075		
Q35	15	3.4000	1.2984		
Q51	15	3.2667	1.2228		
---------- DIV=Z ----------					
Variable	N	Mean	Std Dev		
Q9	7	5.1429	0.6901		
Q48	7	4.8571	0.8997		
Q36	7	4.7143	1.2536		
Q46	7	4.7143	1.7043		
Q12	7	4.5714	1.2724		
Q13	7	4.5714	1.2724		
Q37	7	4.5714	1.2724	Num(I)=	4.6964
Q3	7	4.4286	0.9759	I=	1.2298
Q33	7	4.4286	1.1339		
Q53	7	4.4286	1.3973		
Q2	7	4.2857	1.3801		
Q4	7	4.2857	0.4880		
Q11	7	4.2857	1.2536		
Q49	7	4.2857	1.3801		
Q30	7	4.1429	1.2150		
Q47	7	4.1429	1.2150		
Q6	7	4.0000	1.1547		
Q10	7	4.0000	1.7321		

Q20	7	4.0000	1.1547		
Q21	7	4.0000	1.8257		
Q22	7	4.0000	1.7321		
Q34	7	4.0000	1.2910		
Q43	7	4.0000	1.9149		
Q50	7	4.0000	1.2910		
Q52	7	4.0000	1.2910		
Q1	7	3.8571	1.8645		
Q7	7	3.8571	1.2150		
Q24	7	3.8571	1.5736		
Q51	7	3.8571	1.2150		
Q5	7	3.7143	0.9512		
Q29	7	3.7143	0.7559		
Q32	7	3.7143	1.9760		
Q42	7	3.7143	1.4960		
Q18	7	3.5714	2.1492		
Q23	7	3.5714	1.5119		
Q38	7	3.5714	1.8127		
Q19	7	3.4286	2.2254		
Q26	7	3.4286	1.7182		
Q35	7	3.4286	1.5119		
Q41	7	3.4286	1.7182		
Q27	7	3.2857	1.3801		
Q39	7	3.2857	1.8898		
Q40	7	3.2857	1.6036		
Q14	7	3.1429	1.9518		
Q17	7	3.1429	1.5736		
Q28	7	3.1429	1.2150		
Q31	7	3.1429	1.5736		
Q8	7	3.0000	1.1547		
Q15	7	3.0000	1.9149		
Q16	7	3.0000	1.7321		
Q25	7	2.8571	1.5736		
Q45	6	2.8333	0.7528		
Q44	7	2.7143	1.2536		

Appendix O. Shenandoah Core Values

1		The SAS System			1
				18:23 Friday, March 12, 1993	
Value	N	Mean	Std Dev	MCV	
Q46	170	5.0647	0.9493	77.98%	
Q9	171	4.8655	0.8809	79.76%	
Q50	170	4.8353	0.8817	80.28%	
Q48	169	4.9290	0.9855	80.86%	
Q12	170	4.9059	0.9806	81.14%	
Q49	169	4.7633	0.8747	81.34%	
Q3	171	4.7310	0.8528	81.44%	
Q13	169	4.8343	0.9739	82.20%	
Q33	170	4.8647	1.0488	83.23%	
Q2	171	4.7135	0.9670	84.16%	
Q20	169	4.5799	0.9296	85.80%	
Q40	170	4.6118	0.9802	86.31%	
Q21	170	4.5706	0.9473	86.36%	
Q32	170	4.6706	1.0535	86.79%	
Q1	171	4.7193	1.0969	86.81%	
Q42	170	4.6118	1.0041	86.82%	
Q41	170	4.6118	1.0158	87.08%	
Q22	170	4.4706	0.9862	89.16%	
Q11	169	4.5385	1.0579	89.41%	
Q24	170	4.5647	1.0818	89.42%	
Q14	170	4.8118	1.3278	89.94%	
Q19	169	4.6095	1.1604	90.26%	
Q30	170	4.4647	1.0329	90.33%	
Q5	169	4.4201	1.0094	90.71%	
Q29	169	4.2663	0.8831	91.02%	
Q27	169	4.4083	1.0545	91.98%	
Q4	170	4.3000	0.9598	92.09%	
Q23	170	4.3412	1.0095	92.36%	
Q17	169	4.4852	1.1449	92.41%	
Q53	170	4.3647	1.0642	93.11%	
Q28	170	4.4176	1.1444	93.82%	
Q6	170	4.2647	1.0578	95.15%	
Q26	170	4.2824	1.0836	95.36%	
Q10	170	4.3176	1.1483	96.08%	
Q38	170	4.2882	1.1328	96.38%	
Q43	170	4.1765	1.1166	98.57%	
Q18	170	4.3235	1.2991	99.43%	
Q7	171	4.1111	1.1502	100.95%	
Q15	170	4.3765	1.4265	101.14%	
Q52	169	4.0592	1.1428	102.06%	
Q51	168	4.0714	1.1611	102.20%	
Q45	168	4.0060	1.2405	105.86%	
Q16	168	3.9524	1.1979	106.21%	
Q47	168	3.8036	1.1281	108.53%	

Q37	169	3.9882	1.3496	109.06%	
Q25	169	3.7101	1.1516	111.90%	
Q31	170	3.7294	1.1856	112.23%	
Q39	170	3.7235	1.2640	114.51%	
Q36	170	3.8059	1.4279	116.34%	
Q8	171	3.4503	1.2086	121.98%	
Q34	170	3.3941	1.4029	129.72%	
Q35	170	3.3412	1.4436	133.00%	
Q44	170	3.3529	1.4813	133.65%	

Appendix P. Shenandoah Division Means

1		The SAS System			1
			22:22 Thursday, March 25, 1993		
---------- DIV=S ----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	10	5.1750	0.2958	4.8750	5.6250
BEHAV	10	76.1562	11.2953	59.8077	94.9057
DBEHAV	10	81.3125	13.0186	60.0000	99.3750
EFFECTS	10	3.7350	0.5637	2.9000	4.7000
CULTGAP	10	0.7959	0.4786	0.1698	1.5472
PERFRMCE	10	0.7813	0.4548	0.3125	1.5625
PEOPLE	10	0.9750	0.9900	0.0000	3.3333
JOB	10	1.3000	0.8644	0.0000	2.5000
FIT	10	0.8000	0.5627	0.0000	1.7500
CANONL	10	0.2446	1.1487	-2.4469	1.5036
CANONL2	10	-0.9133	0.7674	-2.2998	0.0693
NCOM	10	4.4375	0.8565	2.6250	5.6250
ICOM	10	2.9750	0.7495	1.5000	4.2500
JOBSATIS	10	7.7000	2.6268	3.0000	11.0000
GROUP	10	4.3722	0.9855	2.0000	5.6667
---------- DIV=T ----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	45	4.9725	0.7283	2.1250	6.0000
BEHAV	44	71.9219	18.3147	27.8302	115.2264
DBEHAV	44	78.5038	19.3475	21.2500	100.0000
EFFECTS	45	3.7200	0.5417	2.6000	5.0000
CULTGAP	45	0.9260	0.6383	0.3396	3.9245
PERFRMCE	45	0.8720	0.7249	0.1250	4.0000
PEOPLE	45	1.0194	0.9072	0.0000	5.0000
JOB	45	1.8333	1.4001	0.0000	5.0000
FIT	45	0.7019	0.6616	0.0000	3.0000
CANONL	44	0.0923	1.1787	-4.0917	1.9152
CANONL2	44	-1.3445	0.9715	-4.1055	0.5524
NCOM	44	4.0535	0.9590	2.2857	6.0000
ICOM	44	2.7443	0.8361	1.2500	5.7500
JOBSATIS	43	7.8140	2.1409	3.0000	11.0000
GROUP	44	4.1976	0.8147	2.5556	5.5556

---------- DIV=U ----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	34	5.0319	0.4938	4.0000	5.8750
BEHAV	33	75.5263	12.6579	31.9623	94.7170
DBEHAV	33	84.3393	11.3734	50.2500	100.0000
EFFECTS	34	3.3147	0.5106	2.2000	4.2000
CULTGAP	34	0.8111	0.4900	0.0000	1.9811
PERFRMCE	34	0.6547	0.4165	0.0000	2.1250
PEOPLE	34	0.8356	0.6952	0.0000	3.2500
JOB	34	2.0466	1.4308	0.0000	4.7500
FIT	34	0.5956	0.7334	0.0000	2.7500
CANONL	33	0.3072	0.7886	-1.7361	1.4267
CANONL2	33	-1.5341	0.8838	-3.5553	-0.0266
NCOM	34	4.0005	0.9571	2.2500	5.8750
ICOM	34	2.7574	0.8779	1.5000	5.0000
JOBSATIS	34	7.8824	2.2531	3.0000	11.0000
GROUP	34	4.3056	0.7828	2.4444	5.6111
---------- DIV=V ----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	9	5.2222	0.5145	4.2500	5.8750
BEHAV	9	80.2786	9.8589	63.7736	98.5849
DBEHAV	9	90.5556	24.5535	65.6250	145.0000
EFFECTS	9	3.5617	0.5904	2.7000	4.5000
CULTGAP	9	0.8918	0.4934	0.3585	1.6038
PERFRMCE	9	0.7361	0.4120	0.1875	1.5000
PEOPLE	9	1.1271	0.7149	0.3333	2.1667
JOB	9	1.5278	0.9798	0.2500	3.0000
FIT	9	0.6111	0.5320	0.0000	1.7500
CANONL	9	0.1439	0.7559	-1.1072	1.0099
CANONL2	9	-1.3241	0.5995	-2.6728	-0.7055
NCOM	9	4.2500	0.5962	3.1250	5.1250
ICOM	9	2.9444	0.7156	2.0000	4.0000
JOBSATIS	8	6.5000	3.8173	1.0000	11.0000
GROUP	9	4.1844	0.6553	3.2222	5.2778

---------- DIV=W ----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	39	4.6378	0.5507	3.3750	5.5000
BEHAV	39	67.2683	16.5820	19.2453	117.0000
DBEHAV	39	73.0929	16.4987	27.5000	100.0000
EFFECTS	39	3.5103	0.5553	2.5000	4.7000
CULTGAP	39	0.9981	0.5948	0.1887	2.5283
PERFRMCE	39	0.9524	0.7059	0.1250	2.6875
PEOPLE	39	1.0598	0.7063	0.2500	3.5833
JOB	39	1.7949	1.2313	0.0000	5.0000
FIT	39	0.8013	0.7656	0.0000	4.0000
CANONL	39	-0.0017	0.8353	-2.0540	1.8812
CANONL2	39	-1.2097	0.8777	-3.1137	1.5086
NCOM	39	4.3768	0.8685	2.3750	6.0000
ICOM	39	2.9359	0.6731	1.7500	4.2500
JOBSATIS	38	7.8158	2.0776	2.0000	11.0000
GROUP	39	4.1367	0.6161	2.3333	5.5000
---------- DIV=X ----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	12	4.8646	0.7000	3.6250	6.0000
BEHAV	12	64.1881	18.9660	31.2830	92.0588
DBEHAV	12	70.7396	18.8927	38.8750	98.1250
EFFECTS	12	3.7167	0.4345	2.8000	4.4000
CULTGAP	12	1.1343	0.3695	0.5472	1.5849
PERFRMCE	12	1.0703	0.6214	0.2500	2.6250
PEOPLE	12	1.0681	0.4664	0.4167	1.9167
JOB	11	2.4318	1.0434	0.7500	3.7500
FIT	11	0.7273	0.3251	0.2500	1.2500
CANONL	11	-0.1190	0.7286	-2.0062	0.7442
CANONL2	11	-1.7576	0.8349	-3.3410	-0.7982
NCOM	12	3.7917	0.8600	2.0000	5.0000
ICOM	12	2.9236	0.7869	2.2500	4.7500
JOBSATIS	12	7.3333	1.7753	5.0000	11.0000
GROUP	12	3.9315	0.7162	2.5000	5.0000

---------- DIV=Y ----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	15	4.4333	0.7689	3.0000	5.8750
BEHAV	15	71.6486	14.5158	41.9231	95.3846
DBEHAV	15	77.6667	15.5575	48.1250	97.5000
EFFECTS	15	3.5467	0.4764	2.7000	4.3000
CULTGAP	15	1.1343	0.6386	0.3077	2.9811
PERFRMCE	15	1.2217	0.9696	0.2000	4.1875
PEOPLE	15	1.0500	0.6841	0.1667	2.2500
JOB	15	1.8500	0.8388	0.7500	3.5000
FIT	15	0.7500	0.5000	0.0000	2.0000
CANONL	15	0.1615	0.7960	-1.2065	1.4053
CANONL2	15	-1.4087	1.0256	-3.5538	0.4920
NCOM	15	3.9750	1.0693	2.3750	5.6250
ICOM	15	2.6333	0.7841	1.2500	4.0000
JOBSATIS	15	8.2000	2.3053	3.0000	11.0000
GROUP	15	4.2473	0.9315	2.5556	5.6667
---------- DIV=Z----------					
Variable	N	Mean	Std Dev	Minimum	Maximum
CORE	7	4.5714	0.9892	3.2500	6.0000
BEHAV	7	54.7932	26.7948	1.7547	83.2692
DBEHAV	7	60.1250	32.4543	2.0000	93.7500
EFFECTS	7	3.7143	0.2911	3.4000	4.2000
CULTGAP	7	1.5486	0.7072	0.5385	2.2830
PERFRMCE	7	1.5893	0.8523	0.5000	3.0000
PEOPLE	7	2.0714	1.2905	0.7500	3.9167
JOB	7	1.6429	0.6268	1.0000	2.7500
FIT	7	1.7857	1.6421	0.5000	5.0000
CANONL	7	-1.0949	1.6408	-3.6622	0.5198
CANONL2	7	-0.1378	2.0970	-1.8800	4.2793
NCOM	7	4.0000	0.9186	2.6250	5.6250
ICOM	7	3.0000	0.8165	2.0000	4.0000
JOBSATIS	7	8.8571	2.1157	6.0000	11.0000
GROUP	7	3.8889	0.7005	2.6667	4.7778

Vita

Larry A. Mallak was born June 4, 1962 in Urbana, Illinois. He received his bachelor's degree in industrial engineering from the University of Illinois in 1984. Larry was a AAAS Mass Media Science and Engineering Fellow in 1984 and served his fellowship at WOSU radio in Columbus, Ohio. He went on to earn his master's degree in industrial engineering from Virginia Tech in 1986. He spent three years in industry as a management consultant to healthcare organizations while employed by SunHealth Enterprises Inc. of Charlotte, North Carolina. In 1990, Larry returned to Virginia Tech as a research associate and in 1991 he began full-time studies in the industrial engineering Ph.D. program, in the management systems engineering option. He received his Ph.D. in 1993 and was appointed to the industrial engineering faculty at Western Michigan University in Kalamazoo, Michigan.