

A MEASURE OF DECISION MAKING ETHICS WITHIN  
THE AVIATION AND AEROSPACE INDUSTRY

By

NED S. REESE, III

Bachelor of Arts  
Southern Nazarene University  
Bethany, Oklahoma  
1997

Master of Science  
Oklahoma State University  
Stillwater, Oklahoma  
1998

Submitted to the Faculty of the  
Graduate College of the  
Oklahoma State University  
in partial fulfillment of  
the requirements for  
the Degree of  
DOCTOR OF EDUCATION  
December, 2000

COPYRIGHT

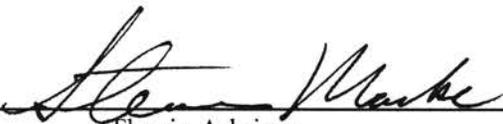
By

Ned S. Reese, III

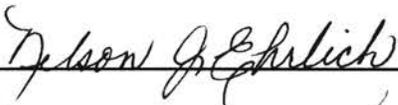
December, 2000

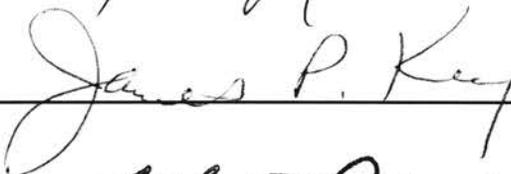
A MEASURE OF DECISION MAKING ETHICS WITHIN  
THE AVIATION AND AEROSPACE INDUSTRY

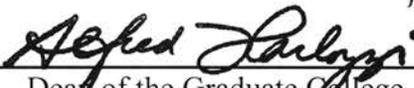
Thesis Approved:

  
\_\_\_\_\_  
Thesis Adviser

  
\_\_\_\_\_

  
\_\_\_\_\_

  
\_\_\_\_\_

  
\_\_\_\_\_  
Dean of the Graduate College

## ACKNOWLEDGMENTS

This represents closure to a journey begun years and years ago . . . and, as is true with every journey, this one has been influenced, encouraged, and enhanced by a number of people. It would be inappropriate, if given the chance, to not acknowledge their part. My grandparents, both maternal and paternal, and both my Mother and Father are deceased, but to them, obviously, goes a considerable amount of thanks and credit for the part they played in the formation of my basic life skills and abilities – especially, the gift of a work ethic developed and evolved over several generations.

A very special debt of gratitude is owed to Ms. Marie Armstrong, a math professor at Mississippi State University, now retired, for showing me what possibilities life holds for us . . . for teaching me about obstacles and the fact that they are just illusions, and for modeling the role of teacher by simply stating she was just encouraging me to remember what had always been inside. Her example of courage and commitment is forever a mold I could only hope to fill. Dr. Gregory May helped to “pull the curtains back” and reveal the true meaning of responsibility – to others and myself. He was also instrumental in helping me deal with the incalculable loss of my first-born daughter - Shannon. Drs. Woody Woodward, Jim Boone, Nelson Ehrlich, and Guy Sconzo have all been extremely influential in modeling the academic responsibilities of the teaching role that I aspire to. Dr. Todd Hubbard has been a colleague, advocate, adviser and friend throughout this arduous process. Dr. H. C. “Mac” McClure is owed a particular debt for

his encouragement, belief in me, and leadership role in both my career and personal life. I consider “Mac” to be the consummate Federal Executive. He is a mentor, a selfless human being, and has an abundance of “grace.” I also owe a special debt of gratitude to Roger Jolley, my partner in managing the Air Traffic Division in the FAA Academy. Without his great skills and abilities as a manager and leader, and his support for me over these last several years this would have been a significantly more difficult journey.

My children have also provided both support for this journey and the ever-present realization of what the journey has been about. So to Heather (Erinn), Shawn (Casey and Hunter), Gwenn and Kyle, thanks for your patience and understanding. And finally, a deeply felt thanks to my wife, partner, and friend – Sheryl. We share an inexplicable bond and have made a significant part of this journey together. It has been fraught with emotional highs and lows, and numerous challenges. The net results have been a goal achieved and a stronger relationship. We are both better for this journey and beyond . . . thanks.

For their part in bringing closure to this journey in a way that allowed me to have some grace . . . a thanks to Donna Christenberry and Kay Porter. Without their experience, expertise, and confidence, this would have been a far more difficult journey to close. Thanks for your support.

And, finally, a thanks to that spirit within me that never lets me forget . . . the challenge is to think beyond the obvious; the goal is to expand beyond the present; and the expectation is to be more than the physical.

## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION .....	1
Problem Statement .....	6
Purpose Statement .....	7
Hypothesis .....	7
Definitions .....	8
Summary .....	10
II. REVIEW OF LITERATURE .....	12
Introduction .....	12
Ethics .....	14
Background .....	16
The Ancients .....	18
David Hume (1711-76) .....	23
Immanuel Kant (1724-1804) .....	25
John Dewey (1859-1952) .....	27
George E. Moore (1873-1958) .....	28
Jean Piaget (1896-1980) .....	29
Lawrence Kohlberg (1928-1987) .....	30
James Rest (1941-99) .....	33
Applied Ethics .....	35
Decision-Making Ethics .....	39
Professional Code of Ethics .....	53
Decision Models .....	58
The Ethical Process .....	58
Reason's Model .....	60
Hosmer's Level of Managerial Responsibility .....	67
Aircraft Accidents and Latent Issues .....	70
Space Shuttle Challenger – January 28, 1986 .....	71
Probable Cause .....	81
Northwest Airlinl Flight 5719 – December 1, 1993 .....	82
Valujet Airlines Flight 597 – June 8, 1995 .....	87
Korean Air Flight 801 – August 6, 1997 .....	92

Chapter	Page
Ethics in the Aerospace Industry .....	97
Boeing .....	97
Raytheon .....	99
NASA/JPL – A Contrast .....	99
NASA and Ethics – Post Challenger .....	100
The Teaching of Ethics .....	105
Knowledge of Ethics and Behavior .....	105
Principle-Centered Leadership .....	107
Texas A&M School of Engineering .....	109
Summary .....	114
 III. METHOD .....	 117
Overview .....	117
Plan of Study .....	117
Research Considerations .....	117
Population .....	122
Characteristics of Population .....	122
Sample .....	124
Sampling Technique .....	124
Sample Size .....	125
Instrument .....	125
Instrument Selection .....	125
DIT Specifications .....	128
Instrument Construct .....	129
Validity and Reliability .....	130
Data Collection .....	131
Collection Procedure .....	131
Translation of Data .....	134
Analysis .....	135
Statistics .....	135
Summary .....	135
 IV. FINDINGS .....	 137
Introduction .....	137
Restatement of Hypothesis .....	137
Population .....	137
Instrument .....	140
Survey Results .....	141
Population Survey Data .....	141
Sub-Group P-Scores .....	144
Demographic Issues .....	145

Chapter	Page
Comparison Data Sets .....	146
P-Scores from Different Groups .....	146
Accounting/Auditing Professionals .....	147
Accounting Students .....	149
P-Score Comparisons of Education and Gender .....	150
Coast Guard Study of Gender .....	152
Educational Studies .....	153
Summary .....	155
V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....	156
Introduction .....	156
Plato's Allegory of <i>The Cave</i> .....	156
Study Overview .....	159
Conclusions .....	159
Comparisons with the General Population .....	159
Comparisons with the Accounting Profession .....	160
Recommendations .....	161
Recommendations for a Code-of-Ethics .....	161
Recommendations for an Aviation and Aerospace Oriented Ethics Course .....	162
Further Research .....	164
Summary .....	165
REFERENCES .....	168
APPENDIXES .....	175
APPENDIX A – INSTITUTIONAL REVIEW BOARD APPROVAL FORM .....	177
APPENDIX B – DEFINING ISSUES TEST – DIT 1 .....	179
APPENDIX C – DEFINING ISSUES TEST – DIT 2 .....	188
APPENDIX D – DEFINING ISSUES TEST VALIDITY AND RELIABILITY .....	197
APPENDIX E – SOLICITATION LETTER .....	200
APPENDIX F – DIT2 ADMINISTRATIVE MATERIALS .....	202

Chapter	Page
APPENDIX G – CENTER FOR THE STUDY OF ETHICAL DEVELOPMENT – COMPILATION OF RAW DATA .....	205
APPENDIX H – SAMPLE MASTER DATA FILE .....	216
APPENDIX I – KOHLBERG’S LEVELS AND STAGES OF MORAL DEVELOPMENT .....	219
APPENDIX J – DIT DEMOGRAPHIC ANALYSIS CHARTS .....	222
APPENDIX K – PLATO’S ALLEGORY OF THE CAVE .....	236
APPENDIX L – CENTER FOR THE STUDY OF ETHICAL DEVELOP REPRINT/ADAPTATION PERMISSION .....	241
APPENDIX M – AEROSPACE DECISION-MAKING ETHICS COURSE SYLLABUS .....	243

## LIST OF TABLES

Table	Page
I. Online Computer Library Center (OCLC) Topical Search . . . . .	13
II. Newspaper Online Archive Search . . . . .	13
III. Guidelines for Determining Ethical Behavior . . . . .	16
IV. Philosophers' Principal Contribution to Decision-Making Ethics . . . . .	17
V. Kohlberg's Stages of Moral Development . . . . .	32
VI. The Five P's of Ethical Power . . . . .	43
VII. Moral Intensity Elements . . . . .	51
VIII. Skill, Rule, and Knowledge Framework . . . . .	61
IX. Active and Latent Errors . . . . .	66
X. Corporate Responsibilities for the Exxon Valdez Accident . . . . .	69
XI. Space Shuttle Challenger, STS-51-L Payload . . . . .	75
XII. Known O-Ring Distress on Space Shuttle Mission . . . . .	80
XIII. Boeing Aircraft Corporate Values . . . . .	98
XIV. Guidelines for Conducting Survey Research . . . . .	118
XV. Population Definition for Study . . . . .	123
XVI. DIT2 Population . . . . .	132
XVII. Agents in Distribution of DIT 2 Survey Packets . . . . .	133
XVIII. Psychological Components That Determine Moral Behavior . . . . .	134

Chapter	Page
XIX. Aviation and Aerospace Population P-Scores . . . . .	142
XX. Mean Indexes for the Overall Survey Population . . . . .	142
XXI. Educational Levels Defined for DIT2 . . . . .	143
XXII. Different Groups on the DIT P-Score . . . . .	147
XXIII. P-Score Means From Accounting Professionals . . . . .	148
XXIV. P-Score Means for Accounting Students . . . . .	150
XXV. Average DIT P-Score by Education and Gender . . . . .	151
XXVI. Average DIT P-Score From Coast Guard Study . . . . .	153
XXVII. Longitudinal Study of Freshman – Senior Comparisons . . . . .	154
XXVIII. Pretest Versus Posttest of Ethics Education . . . . .	154

## LIST OF FIGURES

Figure	Page
1. Ethical Norms .....	46
2. Soft Rules .....	49
3. An Ethical Decision-Making Model .....	50
4. MI Component Quotient Value .....	52
5. Reason's Model .....	64
6. Levels of Managerial Responsibility .....	68
7. Total Population – DIT 2 Distribution Versus Returned .....	139
8. Industry Sub-Group – DIT 2 Distribution Versus Returned .....	139
9. Guidelines for Conducting Survey Research .....	141
10. Population P-Scores .....	144
11. Sub-Group Matrix .....	145
12. Aviation and Aerospace Code-of-Ethics .....	163

## NOMENCLATURE

ARTS	Automated Radar Terminal System
ASPA	American Society for Public Administration
DIT	Defining Issues Test
CERAP	Combined Center/Radar Approach Control Facility
CSA	Customer Service Agent
CSED	Center for the Study of Ethical Development
DOD	Department of Defense
DOT	Department of Transportation
FAA	Federal Aviation Administration
GPWS	Ground Proximity Warning System
HBVCI	Hahm Beller Values Choice Inventory
IFR	Instrument Flight Rules
ILS	Instrument Landing System
JPL	Jet Propulsion Laboratory
VFR	Visual Flight Rules
MI	Moral Intensity
MMAC	Mike Monroney Aeronautical Center
MJI	Moral Judgment Interview
MSAW	Minimum Safe Altitude Warning

NASA	National Aeronautics and Space Administration
NSF	National Science Foundation
NTSB	National Transportation Safety Board
RSA	Ramp Service Agent
SK	Skill-based
SRB	Solid Rocket Booster
SRM	Solid Rocket Motor
STS	Space Transport System
USAF	United States Air Force

## CHAPTER I

### INTRODUCTION

Many issues drive decisions within the aerospace industry today. However, safety has always seemed to be the single most articulated consideration in justifying aviation-related decisions. Manufacturers build system redundancy into all of their aviation related products. Aerospace engineers design systems with multiple-functionality capabilities making the term “redundancy” synonymous with safety. Airlines, ever conscious of their potential liability promote their safety records as marketing tools. The Federal Aviation Administration (FAA) represents the regulatory entity within the aerospace industry. “Safety” is listed as the first of three Mission Goals in the 1998 Federal Aviation Administration Strategic Plan. The FAA lists as Performance Goals for promoting safety within the National Airspace System: (1) by 2007, reduce aviation fatal accidents by 80% from the 1994-96 three-year average, (2) reduce the accident rate by aircraft departure, (3) reduce both the number and type of fatalities/losses from each of the major categories of accidents, and (4) reduce the overall mortality risk for a passenger or crew member on any given flight (Federal Aviation Administration). Clearly, the FAA’s mission is focused on the safety of flight within the U.S.

The association between ethics and decision-making is often difficult to articulate in today’s world. Indeed, most discussion indicates the *ethics* of a person formulating a

decision is seldom a conscious consideration in today's technological environment. It appears the assumption being made is that *ethics*, if anything, is a small component in the process of decision-making. However, many of today's philosophers and ethicists' believe our value systems and ethical constructs are perhaps the most important, albeit transparent, components in our decision-making models. Polkinghorne (1988), in Narrative Knowing and the Human Sciences, suggests that man simultaneously lives in three fundamental realms: (1) the *material realm*, (2) the *organic realm*, and (3) the *realm of meaning*. He considers the realm of meaning, or the *narrative realm*, to be the most important of the three. It is within this *narrative realm* that man's existence is defined for it is here that experience and meaning take shape in the form of linguistic description. It is within this realm that moral constructs and ethics begin to take form and meaning. It is within this realm that decision-making processes are executed and project their intended effect.

Brown (1996), in The Ethical Process: A Strategy for Making Good Decisions, describes a format for training corporate managers in processes that emphasizes the ethical components in decision-making and provides insight into how to become more ethical decision-makers. He stresses the importance in knowing the linkages from our classical philosophers to modern-day ethicists and how important they have been in governing actions in today's world:

The *ethical process* belongs to a long tradition of discourse—the practice of thinking and talking together. Its classical roots come from Aristotle's development of the practical syllogism in his Nicomachean Ethics and the enthymeme in his Rhetoric. The practical syllogism consists of two kinds of premises or reasons: universal and particular. By relating them, one can draw a conclusion about what to do. "Vegetables are good for all persons. I am a person. Therefore, vegetables are good for me." The enthymeme is

a practical syllogism with one unspoken premise. Aristotle advises public speakers to learn the beliefs of their audience, and then to rely on them in recommending action. The beliefs function as universal or general principles that connect observations with actions. Since the audience already possesses these beliefs, it is not necessary to voice them. A second major contribution to this tradition was made by the British philosopher, David Hume (1711-1776), who argued that there is no necessary connection between “what is” and “what ought to be.” The move from description to prescription, in other words, always involves a third element, a normative premise, which we call a “value judgment.” Although we continually rely on normative beliefs or general “should” premises, when making observations to support our proposals, we only need to consider them when people disagree with us—when they do not rely on the same value judgments. More recently, Stephen Toulmin in *The Uses of Argument* (1957), outlined an argumentative form that showed how the general premise (or value judgment) that connects action and data relies on its own backing, or what we have called practical assumptions. Toulmin also developed the notion of qualifying one’s conclusions. This tradition has shown that our thinking and talking rely on a variety of resources. Some of the most significant usually remain hidden—at first. (Brown, 1996, p.11)

Ethical decision making in the corporate environment of the United States is coming under increasing scrutiny. The safety and welfare of the public consumer has never been given more attention with considerable exposure being given to a seeming increasing number of accidents and product failures. Three important dimensions of organizational of corporate decision-making ethics are being emphasized: (1) more emphasis placed on leaders with high integrity and a strong sense of public and social responsibility, (2) organizations with the confidence to promote internal dialogue and accommodate dissent, and (3) organizations that retrospective and show a willingness and openness to learn from their mistakes (Gottlieb & Sanzgiri, 1996).

Ethics, as a practice, is given considerable exposure within today’s corporations and is fast becoming a focus in the business academic environment (Collins, 2000). In spite of the perception that ethics and economy seem to often be opposing terms

corporate executives are beginning to realize that ethical decision-making produces ethical results and has become a defining element in their overall success (Paine, 2000). The manufacturing element of the aerospace industry today is no exception. A cursory review of the corporate web sites of aerospace manufacturers reveal, as an example, that Boeing, Raytheon, and Lockheed-Martin have dedicated a significant part of the content to the companies' commitment to ethical business practices. However, a similar search of the major airlines' and the FAA's web site did not produce any evidence of material dedicated to ethical practices or position. While this is anecdotal information, at best, it does establish some measure of the visibility of the issue of ethics within these components of the industry.

Aviation safety, as a term, thought, and purpose, is at the core of virtually every element of the industry. But is it really? As an example, deregulation within the airline industry and the emergence of global competition in a market heretofore dominated by the American industry has become a serious threat to the status quo. The results have been a nearly constant series of corporate take-overs, buy-outs, bankruptcies, mergers, and partnerships where profit margin and market share are the most frequently mentioned objectives. In an effort to achieve higher efficiencies, cope with progressive budget problems, and continue to assure the safety of the flying public, the FAA is considering fundamental organizational changes such as a proposal to move into a performance-based, predominately user-fee funded organizational structure. Each of these situations individually, represents change. However, the number and magnitude of these circumstances present challenges and dilemmas to the industry on a scale never before faced. Schiavo, the Inspector General for the Department of Transportation between

1990 and 1996, co-authored a book titled Flying Blind, Flying Safe (Schiavo & Chartrand, 1997). Although many in the aviation industry considered her book to be little more than an exposé of the FAA because of the gross inaccuracies it contained, it is representative of a view that some in the public hold with respect to the FAA, specifically, and the aviation industry at large. Schiavo and Chartrand (1997) address the problems that ValuJet Airlines faced during 1996 to 1997 and how the FAA was guilty of not providing sufficient oversight. The authors discuss problems with aircraft and aircraft parts certification. Chapters in their book are titled “The Tombstone Agency,” and “There’s No Such Thing As ‘Safety’ at the FAA” (Schiavo & Chartrand, 1997). In an industry so dependent upon “safety,” it is appropriate, and essential, to consider the effect of such perceptions and dynamic circumstances. Examples do exist that could indicate a potential erosion of safety concerns within the industry. The Space Shuttle Challenger disaster and the decision processes that led to it have become an icon for critical decision-making within the industry (Vaughan, 1996). Other examples are: (1) the Value Jet DC-9 crash in the Everglades of Florida as a result of a mishandled oxygen bottle shipment and (2) the Air Canada cabin fire that resulted from a known problem with a lavatory water ejection motor. Has safety of the flying public been compromised? What standard of ethics, if any, is being applied and is it consistent throughout the industry. An in-depth study is proposed to determine if decision making ethics within this industry can be detected and measured.

## Problem Statement

The most serious safety issues that develop within the aviation industry are often the result of decisions, policies and procedures that have been projected through multiple layers of management and ultimately manifest themselves in an operational environment where the risk is greatest. These consequences, or latent issues, or rarely considered to be possibilities at the time the initial decision is made. However, they often become the most critical factor in establishing the path to an ultimate accident or incident. The costs for these failures range from the loss of equipment, and organizational assets to horrific loss of human life. These latent issues invariably have an ethical component associated with them. One of the characteristics that professional disciplines are generally recognized for is a set of guiding principles that are usually referred to as a Code of Ethics. These codes serve as models that facilitate decision-making and define moral constructs in the execution of the profession's duties and responsibilities while protecting the welfare of society. The aviation and aerospace industry has never been fully recognized as a singular discipline but rather a mix of many disciplines focused on the multitude of products and services that define aviation. Consequently, it does not have a defined set of principles that could be considered unique to aviation.

Codes of ethics are generally reserved for those areas of endeavor that are considered singular disciplines and culturally accepted as a professional practice. Consequently, there exists a precise criterion that defines a professional discipline. The medical, law and engineering professions are examples of areas of endeavor that meet the criteria for professional disciplines and, thus, have accepted codes of ethics. The

educational institutions that support these professional disciplines have highly evolved infrastructure that teach ethics as defined by that discipline. However, research indicates that the most prevalent mention of ethics within the aviation and aerospace industry relates to procurement integrity expectations and business ethics in general. There is very little evidence of a focus by the industry or educational institutions on the values and moral constructs that deal directly with the ethics of decision-making as it relates to the welfare of society in general and the flying public specifically.

### Purpose Statement

The purpose of this study is to examine ethical standards as they relate to decision-making criteria of mid-level, and above, executives within selected major aviation and aerospace organizations in the United States. Consequently, the primary objective of this research is to determine if a linkage exists that could define, describe, or suggest a metric that could further define the aerospace industry in terms of its commitment to flight and product safety. The activity that is central to any business and defines its focus on the product, service, or support it provides clients is its decision-making processes. An organization's decision-making process is an indicator of its value system, its ethical construct, and a measure of commitment to the larger social processes within which it operates.

### Hypothesis

Differences in the development of moral reasoning of aerospace industry executives, managers, and supervisors as measured by a test to determine one's moral

reasoning ability, will produce results that are higher than comparable studies of other industries and disciplines.

### Definitions

The following definitions and terms are provided to reflect the definitions and usages of the words and phrases as applied within this study.

Agent – Refers to the individual who possesses, projects, or acts within a particular philosophy or environment. The subject of philosophical or ethical discussions.

Applied Ethics – The study of ethics within a specific profession or activity such as, business ethics, engineering ethics, medical ethics, etc.

Deontology – This philosophy asserts that certain kinds of acts are intrinsically right or intrinsically wrong. The rightness or wrongness of an act is not necessarily determined by the goodness or the badness of its results. The agent is left to determine the correct reaction to a circumstance depending upon their personal philosophy provided that they do not violate a higher duty expected by the society within which they live.

Dissensus – Lack of consensus: A preponderance of disagreement

Enthymeme – An incomplete syllogism. A syllogistic argument that has one of the three premises (major, minor, or conclusion) missing and, thus, incompletely stated.

Epistemology – An area of philosophy concerned with the nature, sources and limitations of knowledge. A way or process of knowing and understanding.

Ethics – The philosophical study of moral constructs and morality. The term refers to a system of moral principles established by a defined group to serve as guidelines for a variety of interactions.

Existentialism – A moral theory that states man has no predetermined role established by God or nature. It is the individual's responsibility to establish meaning and purpose.

Morality – The notion of a set of behaviors, rules and expectations that society has defined and accepted as *right*. From a philosophical perspective, *morality* is the methods by which society assures consensus.

Schema – A mental construct based on cognitive experience that assist in organizing and understanding experiences and knowledge.

Syllogism – An Aristotelian construct developed to facilitate academic argument. It consists of a major premise, a minor premise, and a conclusion.

Theoretical Ethics – The broad study of philosophical constructs of ethics and its application to society in general.

Teleology – Reflects the philosophical concept that all of nature is goal directed and purposefully organized. It is a way of describing the actions of a group by stating is their nature to do so.

Utilitarianism – A moral theory that states the most morally right action is the action that produces the most good for all people effected by the action. Its most fundamental precept is to act so as to produce the most happiness.

## Summary

The term *Safety* is felt to be synonymous with *aviation* in today's industry. The FAA constitutes the public segment of the industry and mentions the term frequently in some of its most public and visible documentation and statements. Many entities within the private segment of the industry often speak of ethics and safety in promoting their products and services. However, more often those references are made from a business perspective than from a perspective of the ethics of decision-making. The ethics of decision-making describe a value system that underlies the very foundation of thinking and working. It defines thought processes and actions one must participate in during the most fundamental of decision-making activities. And more importantly, it reflects one's own values and views around priorities as they translate into a work environment. Corporate decision-making is an aggregate of personal values influenced by corporate priorities and can have profound effects with regard to the public welfare. Often investigations have pointed to decisions within organizational structures as contributing to, if not affecting directly, serious aviation accidents.

A closer look at the industry reveals that it does not have a *code of ethics*, or espouse formal definitions of professional behavior regarding decision-making that would address ethical approaches to professional behavior. Neither does it possess, or encourage, a significant amount of formal training or education with regard to decision-making ethics. What does exist is through third-party providers and seminar-type activity.

The purpose of this study was to describe the ethical constructs of management personnel within the aviation and aerospace industry. It provided considerable insight into the effect of latent issues with respect to corporate decision processes. It also provided insight into the elements that would be required to provide effective and meaningful training for aviation and aerospace employees.

## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

The subject of decision-making in the business world of today has been well researched. There are a considerable number of scholarly books, journal articles, and programs available to inform one on the process, goals, and objectives of effective decision-making. However, the field narrowed somewhat when the component of ethics was included. There were, however, multiple interpretations and conflicts over the precise interpretation and application of the research. Hosmer (2000) argued that enough study and research has been conducted to begin to unify the discipline into a more cohesive science and called for that unification to begin. There are many areas of interest that could further benefit from a more disciplined and comprehensive study of applied ethics (Hosmer, 2000). A cursory test was conducted to determine the availability of literature associated with decision-making ethics (Table I and Table II). Numerous databases, periodicals, and newspapers were selected upon which to conduct the search. Three series of key words were chosen to conduct the anecdotal search: (1) "decision-making," (2) "decision-making" and "ethics," and (3) "ethics" and "aviation." The search for the first keyword criteria produced literally thousands of references while the second keyword criteria less than one thousand-two hundred references. When "aviation" and

“ethics” were the keyword criteria less than twenty references were produced. While, admittedly, this effort produced anecdotal information, it was representative of the scarcity of scholarly work, informational studies, and topical articles that have been focused on the issue of decision-making ethics within the aviation and aerospace community.

TABLE I  
ONLINE COMPUTER LIBRARY CENTER  
(OCLC) TOPICAL SEARCH

Source	“Decision-making”	“Decision-Making” and “Ethics”	“Ethics” and “Aviation”
WorldCat	24,000	910	6
ArticleFirst	2400	70	2
ECO	1,900	60	0
ContentsFirst	240	4	0
NetFirst	60	0	0
UnionLists	40	0	0

Note: WorldCat, books and other materials in libraries worldwide; ArticleFirst, an OCLC index of articles from nearly 12,500 journals; ECO, Electronic Collections Online, full text of scholarly journals; ContentsFirst, an OCLC table of contents of nearly 12,500 journals; NetFirst, an OCLC database of Internet resources; UnionLists, OCLC Union Lists of Periodicals.

TABLE II  
NEWSPAPER ONLINE ARCHIVE SEARCH

Source	Search Period	“Decision- making”	“Decision-Making” and “Ethics”	“Ethics” and “Aviation”
L.A. Times	1998-2000	327	0	0
New York Times	1998-2000	916	68	0
Seattle Times	1999	520	12	10
USA Today	2000	50	0	0
Washington Post	1998-2000	656	0	0

Considerable work has been done in the area of corporate ethics and decision-making. Although some studies have found that when most employees are faced with various types of ethical dilemmas and ultimately choose the more ethical alternative it is more a reflection of their personal value system as opposed to a professional position (Fritzche, 2000).

This study sought to identify the aviation and aerospace fields as a singularly de facto profession in need of a specifically developed code of ethics. Such a code could serve as the guiding principals to enhance and formally institutionalize the concept of safety, not as an implied standard, but one that is specifically identified in its purpose.

### Ethics

Ethics and morality are often used interchangeably within society. Merriam-Webster's Collegiate Dictionary (1998) defined *ethics* as: (1) the discipline dealing with what is good and bad and with moral duty and obligation, (2) a set of moral principles or values, and (3) a theory or system of moral values. The Cambridge Dictionary of Philosophy (1999) defined *ethics* as "...the philosophical study of morality. The word is also commonly used interchangeably with 'morality.'" (Audi, 1999) For the purposes of this study *morality* referred to the values assigned by individuals to the *rightness* or *wrongness* of a particular behavior or groups of behaviors. Walker, in an article in Adult Learning, discussed the terminology and use of the words *ethics*, *values*, and *morals* in the context of decision-making. Walker stated that ethics define a standard of conduct against which a person's behavior can be measured. Walker further stated that a person's behavior is based on perceived moral duties and virtues that depend on principles of *right*

and *wrong* (Walker, 1993). For purposes of this study *Ethics* referred to the system, or study of systems, that represent a construct of morals defined by homogeneous society, group, or community.

One of the more difficult and complex issues facing organizations today has been the management of ethical behavior. In this context it not only meant the behavior of the organization, but also the professional behavior of the individuals that work within the organization. Simple guidelines are often provided to assist employees and managers in understanding the operable side of decision-making ethics (Table III). (Goetsch & Davis, 1997). But for all the emphasis and recognition given the need for corporate ethical programs, full understanding of the conceptualization of corporate ethics is still generally misunderstood. There has not been a wealth of empirical studies that could significantly advance the understanding of ethics in the corporate world. Many authorities still consider our knowledge in this area to be elementary at this point with much work yet to be done (Kaptein & Dalen, 2000). However, criteria exist to facilitate the building of a framework upon which ethics and ethical influence on decision-making can be better understood. Three fundamental questions have been formulated to assist in determining what ethical decisions may be warranted by a given situation:

1. Is the proposed decision legal?
2. Is the proposed decision balanced?
3. After making the decision, how well will the decision-maker feel?

Of course, most ethical dilemmas faced by corporate decision makers today would seem to be far too complex to be resolved by those three fundamental questions, but they

provide direction and concepts that can be applied in the initial stage of the resolution process (Blanchard & Peale, 1988).

TABLE III  
GUIDELINES FOR DETERMINING ETHICAL BEHAVIOR

Test	Descriptor
Morning-After Test	How would you feel about this behavior tomorrow morning?
Front-Page Test	How would you like to see this behavior written up on the front page of your hometown newspaper?
Mirror Test	How will you feel about this behavior when you look in the mirror?
Role Reversal Test	How would you feel about being on the receiving end of this behavior?
Common Sense Test	What does everyday common sense say about this behavior?

Note: Adapted from Goetsch & Davis, 1997, p. 95.

### Background

The following historical information has been provided to show the evolution of ethical thought and the development of moral reasoning within the larger discipline of Philosophy. It is important to understand the progression in the development of the study of, and discussion on, ethics and moral reasoning in order to appreciate the complexity of issues facing decision-makers in today's aerospace community. The progression began with the generalized foundational work accomplished by the early Greek philosophers

and quickly moved to the modern and post-modern philosophers who began to focus philosophical thought and analysis on the issue of ethics and moral reasoning. Table IV provides a summary and a chronology of the contributions of these individuals to the evolution of ethical studies.

TABLE IV  
PHILOSOPHERS' PRINCIPAL CONTRIBUTION  
TO DECISION-MAKING ETHICS

Philosopher/ Psychologist	Contribution
Socrates (469-399 B.C.)	Recognized as first Thinker to direct philosophical thought away from concept of causality to intrinsic concepts of human values. Developed the dialectic method of argument.
Plato (427-347 B.C.)	Introduced the notion of the <i>dilemma</i> , which is central to any discussion about ethics. Founder of the <i>Academy</i> in Athens.
Aristotle (348-322 B.C.)	Developed the <i>sylogism</i> as a form of deductive reasoning. Approached <i>ethics</i> by focusing on the <i>morality of life</i> . Authored <u>Nicomachean Ethics</u> , the first treatise on ethics.
David Hume (1711-76)	Developed the general theory of human nature by defining the process of <i>associative thinking</i> , thus moving concept of moral reasoning away from religion.
Immanuel Kant (1724-1804)	First to treat <i>ethics</i> as a singular discipline. Focused morality on man's duty to society moving the concepts of ethics further away from a religious connotation.
John Dewey (1859-1952)	A pragmatist, he was the first to apply the scientific method to the study of philosophy. He felt that truth ( <i>ethics</i> ) was relative to man's environment. Change was constant.
George E. Moore (1873-1958)	Believed the <i>ethical values</i> were irreducible in that they reflect a universal truth. Disagreements over <i>ethics</i> were due to misunderstandings over facts. Aligned with Dewey over the systematic approach to studying <i>ethics</i> .
Jean Piaget (1896-1980)	Primary interest was in studying how the <i>human mind</i> gains knowledge from its environment. First to identify the concept of stages of moral development in humans.
Lawrence Kohlberg (1928-87)	Developed the Six Stages of Moral Development, foundational research in the teaching of ethics. Developed the Moral Judgment Interview as a metric tool.
James Rest (1941-99)	Developed and validated the Defining Issues Test (DIT). Founded the Center for the Study of Ethical Development at the University of Minnesota.

## The Ancients

The classical roots of modern ethics are found in the writings of the earliest western philosophers. Socrates (469-399 B.C.) is acknowledged to be the first to address the notion of ethics. He is recognized by contemporary philosophers as the first 'thinker' to direct philosophical thought away from the physical world, where causality was obvious to the observer, to the more intrinsic concept of human values (Sudley, 2000). The subject was carefully woven into his approach to philosophy and was generally most apparent in his execution of the *dialectic method* of argument. Since there are no writings that can be directly associated to Socrates it is felt by scholars that he only professed his philosophies through discussion and argument, depending upon others to document his efforts. We only know of Socrates' philosophy through the writings of Plato (427-347 B.C.). Plato had studied under Socrates during his last years before he was charged with treason and ultimately executed for poisoning the minds of the early Roman youth. Plato held Socrates in the highest of esteem. In his venerable The Republic (Plato, 360 B.C.), Plato uses the character of Socrates through a series of constructed exchanges, or dialogue, with characters, fictitious and real, to deliver the essence of his philosophy. Early in The Republic, the issue of ethics is addressed during an exchange between Socrates and a character named Cephalus and his son, Polemarchus. Socrates had initiated a discussion on aging and acquiring wealth. In response, Cephalus stated that if one has aged gracefully and acquired a large amount of wealth it would be easier for them to lead a moral life. Further, Cephalus provided an example of the willingness of a wise and wealthy man to do the "just," or right thing, by giving back what is owed to another.

Socrates seized the moment by stating that giving back what is owed can be viewed as both right and wrong. He provides an example where a man took the loan of a weapon from a friend while the friend was of sound mind. The man was ultimately confronted by the friend who, in a fit of anger, demanded the return of the loaned weapon. Socrates then postulated that it might not be the “just” thing in the moment and under those circumstances to return to weapon (Bloom, 1968). Here Plato, through the character of Socrates and his dialogues, introduced the notion of the dilemma. Throughout The Republic, Plato continued to develop a progression of ethical thought whose origins are attributed through dialogue to Socrates. Consequently, it has been difficult for academics to discern between Plato’s contributions and Socrates’ original thoughts.

Aristotle (384-322 B.C.) studied under Plato for twenty years in the Academy established by the latter in Athens. He is credited as the founder of the discipline of philosophy and the approach of intellectual inquiry in the study of the various aspects of philosophy. His contributions to the discipline of philosophy included:

1. The intellectual process of *logical inquiry* based on his theory of “syllogism.” This is a form of deductive reasoning which requires the establishment of a major and minor premise from which an ultimate conclusion can be drawn.
2. He conducted a detailed, comprehensive *study of the natural world* in which postulated on the nature and behavior of organism. This became one of the more visible philosophical differences between Aristotle and Plato.

3. His observations of nature contributed significantly to his views on *metaphysics*. Here Aristotle described his theory of substance by describing the connectedness of form and matter in contrast with potentiality and actuality. Essentially, he considered living organisms to be irreducible beyond the basic elements of life, which explained the ultimate order in the universe.
4. Aristotle made significant contributions to the *study of the mind*, which generally paralleled the science of psychology with connecting themes to religious philosophy. He applied his metaphysical principles and determined that the soul essentially took the form of the body of the particular organism.
5. His contributions to *ethical and political thought* rank among his most profound and enduring works. He felt to correctly understand the moral and political activities and thoughts of human beings one had to correctly understand the basic natural desires of man.
6. He developed a process of literary *criticism and rhetorical theory*, which are direct result of his theories on ethics and political thought (Irwin, 2000).

Socrates and Plato essentially established the foundation for modern ethics; however, Aristotle shaped and developed it into the concept accepted as core principles in the Western world today. His Nicomachean Ethics (Aristotle, 350 B.C.) is felt by scholars to be one of three volumes verifiably written by him. Plato's approach to ethics was to focus on the morality of life. He placed a high value of the role of experience in

developing an intellectual understanding of life's meaning to man. Aristotle, in contrast, was more analytical in nature and placed a high value on observation in developing an understanding of the meaning of life. He professed that there could not be any absolute moral standard that could be applied to life without fully understanding the context within which it was being judged. This approach to relativity would ultimately have a profound effect on scientific, legal, and political for several millennia. Therefore, Aristotle's approach to ethics was more practical in its universal application (Bridges, 2000).

Aristotle strongly felt that all of man's endeavors were ultimately aimed for good intentions. This is best understood in the context of his belief there were no absolutes in contemplating moral standards for people, communities and cultures. A particular value could only be understood in the context of the individual who holds the value. He recognized that an individual within society could indeed hold a value that would be contrary to those held by society. In these circumstances, Aristotle held that society's value would be the one of highest virtue and the one to aspire to. This has become a central theme in the ethics of decision-making. In a society where values can differ, if conflicts arise, the good of society should prevail. Aristotle's concept of politics arises from this view. He considered politics to be the *study of good*. He defined *good* as that which achieves an objective that is desired. Therefore, Aristotle's view of politics was that activity pursued by a society that was designed to achieve a common objective. He considered society's goals to be the highest moral value to embrace. This definition placed ethics as the central theme in the study of politics.

Aristotle also described the type of individual who would be best qualified to pursue the study of politics. Early in his treatise on the subject in Nicomachean Ethics,

he stated that men can only make effective assessments of issues to the extent they understand the issues. In doing so, he established a criterion based upon knowledge, experience, and insight for those individuals who choose, or were selected, to pursue the study of politics. He specifically identified youth, who are lacking experience the experience of life, and individuals who are highly emotional in their dealings, as those individuals who should not be allowed to pursue the study and practice of politics (Aristotle, 1999).

Aristotle's views on ethics and politics were considered to be relevant in today's business world. Wijnberg (2000), a professor at the Rotterdam School of Management has focused on Aristotle's views of human motivation and incentive and identifies them as essentially the same elements that corporations of today should look for in candidates for managerial positions. Wijnberg stated the "... Aristotelian approach suggests that the corporation should be considered as existing to allow the decision maker, who normally is a manager, to live a complete and good life and to make decisions that involve the interest of different stakeholders" (p. 329).

Aristotle's views are also found in a study of the roles of ethics and social responsibility in the conduct of international business conducted by Etheredge (1999). Etheredge addresses the conflict by some authorities in the study of ethics regarding the issue of a corporation conducting business in the interest of its stockholders or toward the social good. Some experts state that if a company works toward the social good they are placing themselves in the role of policy-maker and jeopardizes the health of their organization. Whereas others feel that ethical behavior on the part of a company is more profitable in the long run than unethical behavior (Etheredge, 1999). The latter is clearly

the Aristotelian approach to conducting business. Schudt, in a study of corporate virtues and responsibilities also refers to the Aristotelian approach as the one society expects corporations to embrace (Schudt, 2000).

In summary, Socrates, Plato and Aristotle developed the essential foundations for humankind to contemplate, define, and articulate those behaviors essential for civilization to develop. They provided the concepts upon which academic argument flourished and essentially remains unchanged through the millennia. The *dialectic method* was first described by Socrates and used with great skill to induce thought and imaginings among his peers. Plato introduced the notion of the *dilemma*, which provided a more objective view of decision processes. The development of the *syllogism* as a method of deductive reason has been attributed to Aristotle. It provided a deeper understanding of logical processes. Three extraordinary men with extraordinary insight into human thought processes and behavior provided tools that became timeless in the continuous evolution of mankind. These men were the first to research and describe the human condition...a condition that essentially remains unchanged except through the evolution of technology and geography.

#### David Hume (1711-76)

Hume's most significant contribution to the evolution of the study of morality and ethical development was found in his general theory of human nature (Denise, et al., 1996). Hume established and defended support for the process of associative thinking. He also drew parallels to the human cognitive and adaptive characteristics with those of the higher animals. In doing so he began to move the concept of moral reasoning away

from its traditional focus of religion. Essentially, Hume's position was that there was no natural, supernatural, or causative connection between *what is* and *what ought to be*. The connection could only be the choices man made. To understand those associations one would have to better understand man and his motivations (Denise, et al., 1996). Many philosophers of the time vehemently disagreed with Hume's views but he strongly felt that the mental processes that reflect psychological association with our passions, our belief systems, and the functioning of our imagination were essential to our survival as a culture. This "associative" concept was ultimately seen in relationship with the theory of induction that was developed and refined by the mathematician Pascal (Baier, 2000).

Hume placed considerable significance on the position that ethical disagreements were principally the result of misunderstandings of the facts of an act/event or incorrect assumptions regarding the consequences of an act/event. This differed from the more worldly view of the time that ethical disagreements were the results of the passion over the issues brought to bear by the participants. This clearly represents the core of his theory of human nature and implies the transcendent issues brought into ethical debate by religion were less relevant than man's cognitive and adaptive characteristics. In the consideration of *what is* and *what ought to be* Hume suggested that the linkage was man's desire to affect a better outcome or result. Therein lies the impetus for ethical thought (Denise, Peterfreund, & White, 1996). Thus, Hume's theory of human nature provided the groundwork for future thought and works in the evolution of decision-making ethics.

### Immanuel Kant (1724-1804)

Like Hume, Kant was considered a skeptic. He also discounted the emotional and passionate side of religion with regard to moral reasoning (Denise, et al., 1996). He was considered by his peers to be a paradigmatic philosopher for his period. This basically meant that he observed and understood the working of mankind from the perspective of it existing as a theoretical framework within which its theories, laws, and generalizations were formulated and defined. The term paradigmatic is also frequently associated with Kant's view of man being "autonomous." In a philosophical context "autonomous" referred to man being able to understand, gain knowledge, and act morally within his sphere of existence without depending on sources beyond his existence. This is another example of defining man's understanding and moral reasoning apart from a religious context. Kant's immediate environment may have had anecdotal influence on his view of "autonomy" in that he was born, lived, and died within a 40-mile radius of his home Konigsberg, East Prussia (Denise, Peterfreund, & White, 1996). He is considered to be the philosopher who finally eliminated the medieval influence from modern philosophy and ushered in the new age of "European Enlightenment." He was one of the more, if not the most, prolific philosopher of the last several hundred years, and published these thoughts and opinions regarding his particular view of humankind in several volumes that have become institutionalized foundational works. He expressed his awe in the awareness of human experience as an integral component of the Universe in his work *Critique of Practical Reason* (1788) by stating:

Two things fill the mind with ever new and increasing admiration and awe, the more often and steadily reflection is occupied with them: the starry heaven above me and the moral law within me. Neither of them need I seek and merely suspect as if shrouded in obscurity or rapture beyond my own horizon; I see them before me and connect them immediately with my existence. (Guyer, 2000, pp. 432-433)

Kant is one of the first modern philosophers to treat ethics as a singular discipline.

In fact, the term "Kantian Ethics" is derived from his prolific writings of the period that continue to exert significant influence on today's ethical views. Basically, "Kantian Ethics" are recognized for their focus on the dignity and equality of man separate from a theological base (O'Neill, 2000). The overlying principle of "Kantian Ethics" is that the rational human being has always been guided by ethical principles, which generally applies, to others. The operative word in this overlying principle is "rational." Kant also developed two primary ethical propositions that have become the core of "Kantian Ethics:"

- Ethical Proposition One. For an act to have moral worth it must be done from a sense of duty.
- Ethical Proposition Two. A dutiful act derives its moral value from the principle that drove it, not from its results. (Denise, et al., 1996)

Clearly Kant was focused on the critical aspects of man's duty to society and responsibility to reason within the framework of his environment. "Kantian Ethics" was often criticized for its heavy emphasis on rules, duties, and individual responsibilities (O'Neill, 2000). However, it is this very emphasis that has supported the intent, and the outcomes, of decision-making ethics. It has become very critical in the formulating

decisions, policies, and programs in today's world and can have enormous effects on society as a whole.

### John Dewey (1859-1952)

Dewey was a contemporary American philosopher that provided original thought and perspective to a variety of disciplines. He was considered a philosopher, scientist, and an educator who studied, researched and wrote of metaphysics, epistemology, logic, aesthetics, ethics, social and political philosophy, education and anthropology (Gouinlock, 2000). While his range of involvement covered a broad spectrum, the primary interest of this paper is in his work in the area of ethics and moral reasoning. Dewey's approach to philosophy was considered far more practical than traditional philosophers. While Hume and Kant were considered both "skeptics," a traditional role for mainstream philosophers, Dewey is referred to as a "pragmatist." His concept of philosophy was that the problems and aspirations of common life should be of more interest to philosophy than the esoteric perennial mysteries that then to fuel philosophical thought (Gouinlock, 2000).

One of Dewey's principal innovations in the field of moral reasoning and ethical philosophy was the application of the scientific method to the study of the field. Prior to Dewey's efforts in this area, the scientific method of research and study had been primarily limited to the physical sciences. Consequently, Dewey's theory of ethics was based on a pragmatic view of the universe as constantly changing and evolving. He saw man as being the consummate evolving-being in this scenario, constantly seeking to understand his environment, solve its evolving problems, and adapt where necessary for

survival. This view of mankind was different from the institutional view of man being a spectator of a changing universe driven by universal truths. For Dewey, the universal truth was *change*. Man's definition was relative to his universe. Therefore it was a logical progression for Dewey to believe that truth was also relative and not eternal.

Dewey's view of a constantly changing world, that was best understood from a pragmatic perspective and studied through the application of the scientific method, has had a profound impact on the decision-making activity in an increasingly technological world. Dewey's views helped develop the suggestion that man was perhaps more in control of events than previously believed.

#### George E. Moore (1873-1958)

Moore was considered to be one of the more influential British philosophers of the twentieth century. Although of British nationality, Moore spent a large part of his career teaching in American universities. He was fortunate to study under and become colleagues of preeminent philosophers such as Bertrand Russell, Ludwig Wittgenstein at Cambridge University. Like Hume, Kant, and Dewey, Moore rejected the notion that elements outside of man's environment had any significant effect on man's understanding. He was principally known for his tenacious defense of "the irreducibility of ethical values" (Baldwin, 2000, p. 592). One of Moore's best-known works was *Principia Ethica* (1903). In this book Moore presented the thesis that a fallacy materializes when any attempt is made to define an ethical value. While many philosophers supported his thesis, it remains a serious controversy in the discipline today (Baldwin, 2000).

Moore developed an approach to philosophical argument by reorienting the traditional processes that constructed philosophical frameworks of understanding based on what is empirical fact. Instead, he developed an analytical process that utilized fundamental philosophical questions in an effort to better understand the underlying principle of an event or issue. Moore's own words best describe his view of the analytical approach:

It appears to me that Ethics, as in all other philosophical studies, the difficulties and disagreements, of which its history is full, are mainly due to a very simple cause: namely to the attempt to answer questions, without first discovering precisely *what* question it is which you desire to answer. I do not know how far this source of error would be done away, if philosophers would try to discover what question they were asking, before they set about to answer it; for the work of analysis and distinction is often very difficult: we may often fail to make the necessary discovery, even though we make a definite attempt to do so. But I am inclined to think that in many cases a resolute attempt would be sufficient to ensure success; so that, if only this attempt were made, many of the most glaring difficulties and disagreements in philosophy would disappear. (Denise, et al., 1996, p. 316)

In this approach to philosophical analysis, Moore closely aligned himself with Hume's ideas that ethical disagreements stem from misunderstandings of facts and incorrect assumptions of intent. It also represented the more systematic approach to studying moral development and ethical reasoning, which was promoted by Dewey (Denise, et al., 1996).

### Jean Piaget (1896-1980)

Piaget is considered one of the most influential modern forces that has shaped Western philosophy's understanding of moral judgment and ethics. He was a Swiss-born developmental psychologist who is referred to as the founder of the field of cognitive

development. His primary interest was in understanding how knowledge is gained by the human mind from its environment during the process of development. He is known for the development of two major thoughts, or contributions, in psychology. The first was his emphasis and research into the development of children. His reasoning for studying children was that if by watching them mature in their environment and acquire knowledge in the process, an epistemology could be defined that would arguably apply to all organisms to better understand how they gain and apply knowledge. He referred to this new discipline in psychology as "genetic epistemology" (Gopnik, 2000).

The second primary contribution was the thought that foundational, or primary knowledge, was not necessarily a product of experience, but rather a complex interaction between the agent (person) and their environment (Gopnik, 2000).

Piaget's works, particularly with regard to the process of gaining knowledge as a slow, repetitive, and progressive activity as the individual interacts with their environment, became foundational aspects of Kohlberg's and Rest's work in the area of moral development and ethical reasoning. Piaget also introduced the concept of 'stages' of development by identifying and categorizing the progressive nature of development of the individual and, in so doing, provided the groundwork for systemic research of the ethics and moral constructs involved in decision-making (Modgil & Modgil, 1986).

#### Lawrence Kohlberg (1928-1987)

Kohlberg was a developmental psychologist that is known for his work in the area of ethics and moral development. Essentially for the same reasons that influenced Piaget, Kohlberg chose children to study the development of *reason* with regard to moral

dilemmas. It became the subject of his doctoral research. Accordingly, his hypothesis was that moral difficulties were the primary catalyst in the development of moral reasoning on the part of a child. Consequently, his work in this area also served to enhance the cognitive-developmental view of changes that normally occur coincidentally with age. Kohlberg was greatly influenced by Piaget in the development of his theory of moral development. His research was characterized by the development of questionnaires that presented his subjects with the narrative of a moral dilemma. They were then asked to evaluate the moral issues presented in the narrative. His findings strongly suggested that one's ability to reason from a moral perspective was enhanced proportionally with chronological age and continued indefinitely until death (Gill & Magee, 2000).

Kohlberg was generally seen as a "relationist" within the discipline of developmental psychology. Essentially, this meant that he viewed the development of moral reasoning as being relative to the culture within which it was being viewed. However, as a slight anomaly to the pure relativistic philosophy he did believe at some level all cultures would hold the highest values in common. Kohlberg had numerous critics over this difference but the criticism seemed to be inconsequential with regard to the general acceptance of his work on the development of moral reasoning (Modgil & Modgil, 1986).

Most consider Kohlberg's principal contribution to the study of moral reasoning to be the development of the concept that moral development in human beings occurs in stages that increase in complexity as a function of experience. It is also important to note that these stages reflect the importance, significance and priority of the moral stage unique to the individual. Each subsequent stage also requires higher levels of cognition.

The concept of stages and the "adaptive" nature of the human being in learning from their environment represented the primary influence Piaget had on Kohlberg's theory on the development of moral reasoning (Modgil & Modgil, 1986).

TABLE V  
KOHLMBERG'S STAGES OF MORAL DEVELOPMENT

Level	Stage of Development
Level I (Child)	<p><i>Stage 1: Heteronomous Morality</i> The characteristics of this stage are fairly binary. An action is either judged as right or wrong. The reasons for doing right are simply to avoid punishment. The power of authorities is considered autonomous and unquestionable.</p> <p><i>Stage 2: Individualistic, Instrumental Morality</i> Individuals at this stage consider following the rules only when it is in their interest. They act only in their own interest and expect others to do the same. This is the first stage where there exists recognition that others have their own interests although the tendency is to follow one's own without regard to others.</p>
Level II (Adolescent)	<p><i>Stage 3: Interpersonally Normative Morality</i> The main characteristic of this stage is the recognition that responsible behavior is desirable. It is what is expected by the group of which individual is member of. The emergence of trust, loyalty, respect, and gratitude occurs in this stage. The reason for doing right is essentially one's desire to be associated with appropriate behavior. The 'Golden Rule' manifest here.</p> <p><i>Stage 4: Social System Morality</i> The characteristics of this stage are recognition of the need to obey laws, laws can be overridden in extreme cases, and that 'right' behavior is contributing to society. The reason for doing 'right' is the awareness that to do otherwise would threaten society. The conscience emerges.</p>
Level III (Adult)	<p><i>Stage 5: Human Rights and Social Welfare Morality</i> This stage is characterized by the recognition that society includes people with a variety of values and opinions, but they are most likely associated with a particular group. However, there exist a set of universal rules for society that can transcend the group values and opinions. A utilitarian concept emerges in this stage.</p> <p><i>Stage 6: Morality of Universalizable, Reversible, and Prescriptive General Ethical Principle(s)</i> At this stage the individual has adopted a personalized set of ethical principles. Laws generally reflect those principles; however, when there is a conflict between the two, the principle prevails. The universal principles are the recognition of human rights and the dignity of human beings. The reason for doing 'right' is a belief in the validity of universal moral principles and a personal commitment to them.</p>

Kohlberg's theory of moral development is detailed in Table V. The six stages in the table have been further developed by the addition of levels added by Kohlberg to represent the chronological age where the stages were normally experienced. Level I encompass the first two stages and represent a child's first experience with the requirement to deal with moral dilemmas. Children of ages four to ten are included at this level. Actions at this level are driven by a need to avoid undesirable circumstances or punishment (Stage 1) and the need to satisfy their own desires and needs (Stage 2). Level II is considered the period of 'Conventional Morality' and include the ages 10 to 13. Actions here are driven by an individual's need to avoid peer group rejection and seek acceptance (Stage 3) and the need to avoid criticism by authoritative entities (Stage 4). Level III includes the final stages and represents the period of adolescence through adulthood. These are the stages where Piaget and Kohlberg determined that the refinement of the educational and moral reasoning development took place. Actions by individuals at this level are typically reflected by a respect for the community, social order and accepting the laws of society (Stage 5) and, ultimately, the motivation that is generated by one's conscience (Stage 6) (Gill & Magee, 2000).

The most cited elements of ethics in decision-making research and development are found in Stages 5 and 6 of Level III of Kohlberg's work (Munsey, 1980; Rest, 1979,1994; Rest, et al., 1988A, 1999).

#### James Rest (1941-99)

Rest was a professor in the Department of Educational Psychology at the University of Minnesota and had served in various capacities there for 29 years until his

death in 1999 but his major field of study was moral cognition. He co-founded the Center for the Study of Ethical Development in 1982, which has become a major focal point for the study of moral reasoning and ethical development in the United States. One of his principal contributions to the field of moral reasoning was the development of the Defining Issues Test (DIT) (Anderson, 2000).

Developing test measures that could accurately predict one's level of moral development and ability to apply ethical standards to decision processes was extremely difficult. Kohlberg developed a Moral Judgment Interview (MJI) that set a precedent in this field. Scholarly review of the MJI determined that although it had high content reliability it drew criticism over its methodology. The MJI depended upon an interviewer who would ask the interviewee various questions about moral dilemmas that were designed to reveal the schema used by the subject to access the moral issues in the example. Much of the criticisms center around the subjective participation of the interviewer in the interview process itself. Many felt it introduced variables associated with the interviewer that could possibly have an effect on the responses of the interviewee. Another criticism was directed at the narrative scoring of the results by the interviewer. It is globally recognized that serious misinterpretations can occur between a written form of one's view of a moral issue as opposed to the verbal description of one's view of the same moral issue. Therefore, rater reliability became a significant concern with the administration of Kohlberg's MJI due to a large number of interviewers producing test results that could possibly be skewed by the interview process itself (Rest, 1979).

The Department of Educational Psychology at the University of Minnesota, under Rest's guidance, determined that the core values of Kohlberg's approach to measuring moral schema were correct. Consequently, their principal efforts were directed at correcting the problems with its methodology. The result was the DIT and the development of what has become known as the neo-Kohlbergian Approach. The DIT test has been collecting data for 25 years and has been the principal data gathering device for over 400 studies (Rest, Narvaez, Thoma, & Bebeau, 1998A). A more detail discussion on the neo-Kohlbergian approach to morality research will be treated in Chapter III of this paper.

The importance of the contributions of Piaget, Kohlberg, and Rest is in the development of scientific tools designed to better understand the moral constructs and ethical dimensions of decision-making in our culture.

### Applied Ethics

This particular field of ethics was considered to be the domain of professional ethics. Its intent has been to focus on the ethical dilemmas that are specifically associated with a very narrow field of experience or an endeavor that is associated with a specific application to society and apply general constructs of moral theory to that field. It represented an attempt to take the broader study of philosophy and ethics and attempt apply it to a particular social or professional activity (Audi, 1995/1999).

Applied ethics is best understood by defining it as the application of the philosophy of ethics and moral constructs in a practical setting or environment. Wijnberg used the writings of Aristotle to illustrate his views of normative stakeholder theory and

how politics and ethics are still very much an aspect of today's corporate environment (Wijnberg, 2000). Bartlett and Preston also used Aristotelian concepts in describing the need for business to support the social good; however, they focused more on the internal difficulties of promoting such concepts within organizations than external benefits (Bartlett & Preston, 2000). It has become beneficial to describe applied ethics by defining the three major components of ethics as the macro-discipline and explaining how they interacted to establish the discipline of applied ethics:

1. **Morality** – This component of ethics describes the initiatives of individuals in the determination of what is moral. This is a group of individuals', or communities', view of the rightness or wrongness of particular behaviors or circumstances and does not necessarily require a foundation of logic or rationality. When these moral views reflect a systematic approach to behavior it can be referred to as an *ethic* or *morality*. Examples are given as a Christian morality, or a legal or medical ethic.
2. **Moral theory** – The second component of ethics as a discipline is the development of a foundation (infrastructure) of defining principles upon which judgments of morality can be made. It must be noted that morality and moral theory (a system of principles) are not necessarily dependent upon each other. It is entirely possible to establish a moral expectation without having a principle underlying it as justification. An example would be the immorality of "lying," judged solely because it results in unhappiness, is intrinsically wrong, or does not support fair social

interaction. A moral theory that would underpin the wrongness of lying would be a principle of truth as a value. Therefore, moral theory would indicate a logical foundation (infrastructure) of a cogent set of principles upon which judgments of morality could be based.

3. Meta-ethic – This component of ethics is not concerned with the rightness or wrongness of an issue but, rather, with the logical constructs of morality and moral theory. Meta-ethics is considered by most philosophers to be the more philosophical and abstract form of deliberation of the philosophy of ethics. Because meta-ethics considers whether the moral values and constructs accurately reflect objective values that relate to our society and culture, it has become the linking activity between the study of ethics philosophy and applied ethnics (Wijnberg, 2000).

There has been a rising interest on the part of students and professors in academic environments, as well as corporate communities with respect to applied ethics. It is represented by a groundswell of interest upon which the growth of applied ethics has been attributed to. More people have become interested in the moral obligations to society that is implied in the professions. Medical, law, engineering, and environmental professions have led the way in this new approach to ethics and it is felt by many philosophers that it will soon spread to virtually all areas of social interaction (Bunnin & Tsui-James, 1996).

While the interest in applied ethics as a scientific discipline has spread through numerous professions, comprehensive studies of ethics within corporations and large organizations is fairly non-existent. Kaptein and Van Dalen (2000), in their study of corporate ethics, state that without proper analysis and a more thorough understanding of

the conceptualization of applied ethics within corporate structures, scientific discussion can only be speculative in nature. They indicated two primary reasons for the current lack of empirical knowledge of corporate/organizational ethics: (1) the absence of a functional definition of the concept of corporate ethics, and (2) the current normative and functional definition of corporate ethics refers to specific behavior of individuals rather than organizational practices. In order to better describe these issues it was helpful to understand the different approaches, or perspectives, that can define the concepts of organizational ethics. These three approaches need to be used together in describing an organization's ethical environment (Kaptein & Van Dalen, 2000):

1. Consequence approach – This approach describes the impact of organizational practices on the stakeholders. In the corporate environment this refers to the shareholders of a company, its customer-base, and in some cases the companies employees.
2. Conduct approach – This approach describes the conduct and behavior of individual employees, or representatives, of the organization. Since this approach is more specifically focused on individual conduct and behavior it can not be a valid indicator, used by itself, of the organizational ethics. Its criticality comes from the fact that often perceptions of an organization can come from the perceived behavior of single individuals.
3. Context approach – This approach generally characterizes the general climate within the organization. It addresses the organization's tendency to foster caring, rules-oriented, procedures-oriented, etc. environments.

A careful, deliberate approach to studying the ethical constructs within organizations as characterized above can create the type of empirical information that can become instrumental in better understanding the concept of applied ethics (Kaptein & Van Dalen, 2000).

Another area of interest regarding applied ethics was found in the area of international commerce. With the growing world economy the difference in business and cultural ethics among different countries have been considered significant factors in conducting business. To better help define these differences and assist organizations to achieve a higher degree of success in the international business community the Perceived Role of Ethics and Social Responsibility (PRESOR) instrument was developed. This instrument measures the perceived role of ethics and social responsibility of agents working across international boundaries (Singhapakdi, et al., 1996). Etheredge, a Professor and Research Fellow in the Centre of Applied Ethics, Hong Kong Baptist University, used the PRESOR in the study of potential differences between Hong Kong and United States executives and managers. Clear cultural differences were established in this study with regard to the definition of business ethics and whistle blowing. Nearly 52% of the Hong Kong respondents felt that business ethics addressed the ability of a company to stay within the law regulating that business. Only 11% of the United States' respondents agreed with that definition (Etheredge, 1999).

### Decision-Making Ethics

Decision-making ethics is technically about individual choices, and researchers in industry and academia have been interested for years in looking for appropriate measures,

correlations, and other relevant factors that could help define better the concept of decision-making ethics (Frey, 2000). The ethics of corporations and other organizations are ultimately a reflection of the lowest common denominator of organizational structure: people. Consequently, individuals within organizations who, when confronted with dilemmas and make choices are ultimately making choices for the organization. Therefore, corporate behavior and ethics is the manifestation of the behavior and ethics exhibited by all of the people who comprise that organization weighted by their sphere of influence and numbers. Considerable research into the philosophical issues surrounding decision-making ethics in the corporate environment has been conducted including the role deontological, teleological, and existential philosophies play in the processes (Agarwal & Malloy, 2000). Goetsch and Davis (1997), in their textbook, Introduction to Total Quality, discussed this foundational element of organizational ethics. They defined ethics for a corporate structure seeking to achieve a *total quality* environment as "...the study of morality" (p. 94). They enhanced that definition by expanding the term to include the concepts of trust, responsibility and integrity. Together, these terms represented the totality of a value system necessary for an organization to develop and maintain a *total quality* environment.

Bartlett and Preston (2000) discussed at length the issues of ethical behavior and business including the questions as to whether the two are compatible. While their research indicated that businesses are expected to support the social good – an Aristotelian concept frequently citing throughout the literature – it is a concept that has not been necessarily accepted within business organizations. They cited one of the primary reasons for this is the fact that business exists to create a profit for its

stakeholders, which can, under some circumstances, be counter-beneficial for the social good. When confronted with these types of issues employees become skeptical of the concepts of business ethics. If "...a common view of success and the 'good' life is one determined by hard work in a well-organized company operating in a free market" (p. 199), then there are no moral choices to make. The choices are between being successful as a company, or not. The implication is that if employees truly see no ethical choices to be made, then ethics and the social good is not necessarily a factor in their deliberations. In fact, their research suggested that the ethical standards applied by employees in their work roles may be significantly lower (Bartlett & Preston, 2000, pp. 201-202) than the ones used in similar circumstances outside of their work role. This has presented managers with serious dilemmas to address in terms of motivating their workforce. Most companies accept their responsibilities to the public and fully understand their long-term interests are better served by being supportive of the communities' interests (Bartlett & Preston, 2000). These same concerns are projected into the issue of decision-making ethics during negotiation between entities within the organizational structure. This includes negotiation between peer organizations, labor/management negotiations, etc. Tenbrunsel (1998) suggested that the incentives, or agendas, on the part of opponents in the negotiation process can influence their desire to misrepresent, or embellish, their respect positions. This extends to their perceptions of their opponent's positions in the negotiation process as well (Tenbrunsel, 1998). This presents a clear dilemma in managers' efforts to enhance corporate decision-making ethical behavior.

The development of a corporate pattern of ethical behavior starts first with the management structure. If management is interested in the people within the organization reflecting the ethical values professed by the organization those values must be promoted and encouraged. Mission, vision, and values are a central part of the total quality movement and for it to be successful it must be embraced by all of the individuals within the organization. In order to accomplish this, however, manager must first be aware of the broad scope and range of value systems and moral constructs that are manifest at the employee level within their organizations. An experiment conducted by Johnson and Ohmer in 1998 suggested that social consensus exerted a considerable influence on the moral and ethical constructs of individuals in organizational settings (Johnson & Ohmer, 1998). Knowledge of this type is essential for managers intent on developing a set of values and visions that will reflect the corporation's interest. If managers are not sensitive to these dynamics it can place considerable stress on employees and can ultimately produce the opposite effects desired (Sims & Keon, 1999; Sims & Keon, 2000). In fact, research by Street, Roberson, and Geiger suggested that another variable may be working within organizations as they increase their commitment to ethical decision-making. They reported there are indications that during this escalating phase to emphasize ethical behavior within their organizations the likelihood that individuals may choose unethical alternatives appears to increase (Street, Robertson, & Geiger, 1997). Research by Thoma and Rest suggested the presence of a similar behavior in people who are undergoing lifestyle, environmental, or situational changes of some degree. They referred to the process as *consolidations and transitions*. Basically, they found that individuals who are experiencing *consolidations and transitions* of some degree are less likely to depend upon

a moral framework as described by Kohlberg in his stages of moral development (Thoma & Rest, 1999). This type of environment has a dampening effect on the quality of work life, as well (McKenna, 1996).

Blanchard and Peal (1988) have developed a list of five characteristics they say is important in achieving unity of purpose regarding ethics within an organization. They referred to it as “The Five P’s of Ethical Power” (Blanchard & Peal, 1988, p. 79) (Table VI). Knowledge of these motivators and thought processes of individuals is essential if management hopes to affect the organizational commitment to its mission, vision, and values. Creating the environment within the organization that nurtures and supports the corporate value system is one of the more difficult tasks faced by managers.

TABLE VI  
THE FIVE P'S OF ETHICAL POWER

P	Description
Purpose	Individuals see them selves as ethical people who let their conscience be their guide and in all cases want to feel good about themselves.
Pride	Individuals apply internal guidelines and have sufficient self-esteem to make decisions that may not be popular with others.
Patience	Individuals believe right will prevail in the long run, and they are willing to wait when necessary.
Persistence	Individuals are willing to stay with an ethical course of action once it has been chosen and see it though to a positive conclusion.
Perspective	Individuals take the time to reflect and are guided by their own internal barometers when making ethical decisions.

The issues around corporate business ethics and ethical decision-making are universal. In a study conducted in the Netherlands numerous multinational corporations and organizations were looked at. It was determined that the programmatic approach to developing ethical programs seemed to be preferred. Systemic approaches that take into consideration all of the various organizational elements, education of personnel, and institutionalizing mission, vision and values seem to produce more lasting results. One of the primary purposes of these programs was to organize responsible behavior on the part of the employees of the organization. Nijhof, Fisscher, and Looise (2000) discussed three basic methodologies for generating ethical behavior within large organizations:

1. Formal Approach – This approach essentially means the development and establishment of a formal set of criteria. Generally, this manifests in the creation of a *code of conduct* that serves several purposes. First, it defines appropriate behavior on the part of employees and assist them in knowing what will be acceptable conduct. It also serves as a set of guidelines that informs the public, or other parties on the outside what can be expected in dealing with the organization. The *code of conduct* represents a set of criteria that helps employees assess right from wrong in addressing dilemmas and making decisions from the perspective of the company's interests. Decision-making utilizing this approach would be considered a *deductive process*.
2. Monological Approach – The Monological approach is considered an alternative to the Formal Approach discussed earlier. It focuses on the individual employee as the singular agent for determining what is right and

wrong regarding a dilemma that needs to be addressed. They rely on their own personal values and experiential approaches to problem solving. The advantages of this approach are that it forces the agent to depend upon academic argument and reflection on personal experience, and provides some flexibility in dealing with unusual circumstances. One of the disadvantages of this approach is that its effectiveness is difficult to measure. It also depends upon a single individual's value system and without oversight can magnify existing differences within the organization. Decision-making utilizing this approach would be considered to be a *reflective process*.

3. Dialogical Approach – This approach is also considered an alternative to the Formal Approach. This approach depends upon the assumption that the rightness or wrongness of an issue can only be determined through the communication between interested groups. Managers who desire to create ethics based programs that depend on the collective knowledge of its employees should make every effort to build opportunities into the process for sharing of information and continuous dialogue between and among homogeneous groups within the organization. Libby and Agnello (2000) conducted research into the dynamics of different demographics of groups interacting to resolve dilemmas and construct ethical based decisions. Their findings supported the inclusion of different groups in the decision-making process to assure the exposure to different and valid perspectives (Libby & Agnello, 2000). The advantages of this approach are its

dependency upon synergy within the organization. It emphasizes the inclusion of ideas and the socialization of the organization. A disadvantage of this approach is that in measuring its effectiveness one is more likely to focus on the process of communication and sharing rather than the outcomes. Decision-making utilizing this last approach would be considered an *interactive process*.

An effective program on organizational ethics would be based on the essential elements of all three of these approaches (Figure 1). Careful implementation can integrate the deductive, reflective, and interactive processes such that they would constitute an organized situational approach to decision-making and dilemma resolution. This assures that the strengths of the organization will come to bear on all issues (Nijhof, et al., 2000).

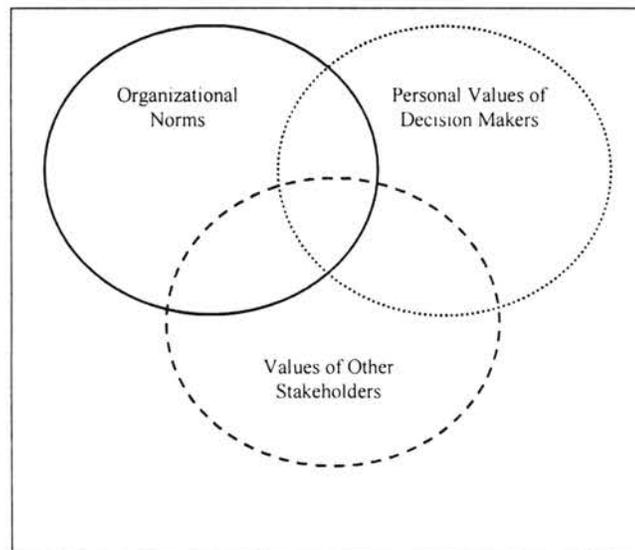


Figure 1. Ethical Norms (Adapted from Nijhof, Fisscher, & Looise, 2000, p. 37).

In a study of values and their effects on decision-making in multi-national corporations, Schnebel (2000) suggested that individual values and a sense of personal responsibility played a significant role in the definition of a corporate ethics structure. In fact, he stated that ethical leadership in large organizations “. . . is first the consideration of different personal and cultural value systems in decision-making processes.” (p. 79) He established second priority as the assignment of responsibility to the fundamentally lowest common denominator within any organization – the individual employee. The method used in Schnebel’s study was to contrast the works of Habermas and Luhmann in speculating on the effects of value systems on ethics and decision-making in a corporate environment. The focus of Schnebel’s interest was to understand the how organizational ethics and decision-making is affected by individual subjectivity and rational behavior. Schnebel quickly associated Habermas’s and Luhmann’s thoughts with those of Kant in that they both separate human behavior and thought processes into rational components and personal values. The primary difference, however, is Habermas’ *Principles of Discourse* (p. 83) establishes subjective individual values and personal communicative processes as informal systems in describing individual subjectivity and rational behavior as it relates to the organization. In a summary of Habermas’ *Principles of Discourse*, all individuals within an organization must:

1. Have the same opportunities to share in the communicative processes.
2. Be able to openly articulate their values and have them critiqued.
3. Be able to be free of any form of censoring of ideas and concepts.
4. Be equal opportunity to state their values, criticize others, accept and resist orders, and be accountable for their actions. (p. 83)

In this way individuals within an organization are free and equal participants in the process of determination. This provides individuals with the personal space and freedom to interact as their personal value system dictates. McClennen (1999) also felt that freedom of the individual was essential for their full asset value to be realized within the organization. It is believed this type of system ultimately creates an environment where personal values can be expressed in ways that ultimately effect the corporate structure. Schnebel referred to corporate ethics in this sense as the “soft rules” (Schnebel, 2000, p. 80) that guide corporate decision-making. It is these ethics, or “soft rules,” that Schnebel believed links the culture of the corporation with the characteristic of personal responsibility.

However, in contrast Luhmann’s *Theory of Systems* approaches the concept of “soft rules” from a somewhat opposite perspective. His theory stated that subjective individual values and personal communicative processes are better understood as *formal systems* in describing individual subjectivity and rational behavior as it relates to the organization. *Formal systems* by Luhmann’s definition relate to actual business activities and the rules, regulations, and expectations of appropriate behavior that accompany them. In *formal systems* employee behavior and values systems are expressed in business related activity as opposed to informal relationships and discourse that occur internal to the organization. Schnebel believed the same “soft rules” apply in this case , as well, essentially affecting the same results regarding decision-making (Figure 2).

Schnebel’s study essentially provided seemingly contrasting processes to positively effect the ethics of decision-making within larger organizations. In contrasting Luhmann’s and Habermas’ systems and linking them with the concept of the ethics of

“soft rules” he provided contrasting alternatives to promoting the concept of employee involvement in enhancing corporate ethics (Schnebel, 2000).

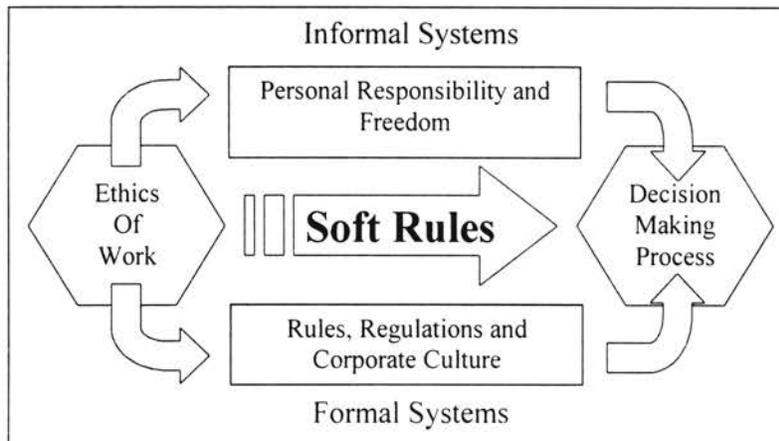


Figure 2. Soft Rules (Adapted from Schnebel, 2000, p. 80).

In another study designed better understand the underlying issues of ethical behavior and the relationships to decision-making within corporations, Bernhard Frey found that individuals confronted with dilemmas were not always likely to respond based on existing decision models (Figure 3). He hypothesized that there were elements that operating within the individual that reflects their personal values that may, or may not, be predicted by the criteria of various models. This is very similar to the views of Schnebel in contrasting Lhumann’s and Habermas’ formal and informal systems (Schnebel, 2000). Frey adopted the term Moral Intensity (MI), first defined and researched by Jones who also studied the latent issues affecting moral decision-making by individuals (Jones,1991). Frey identified six components of MI that can have an underlying affect on

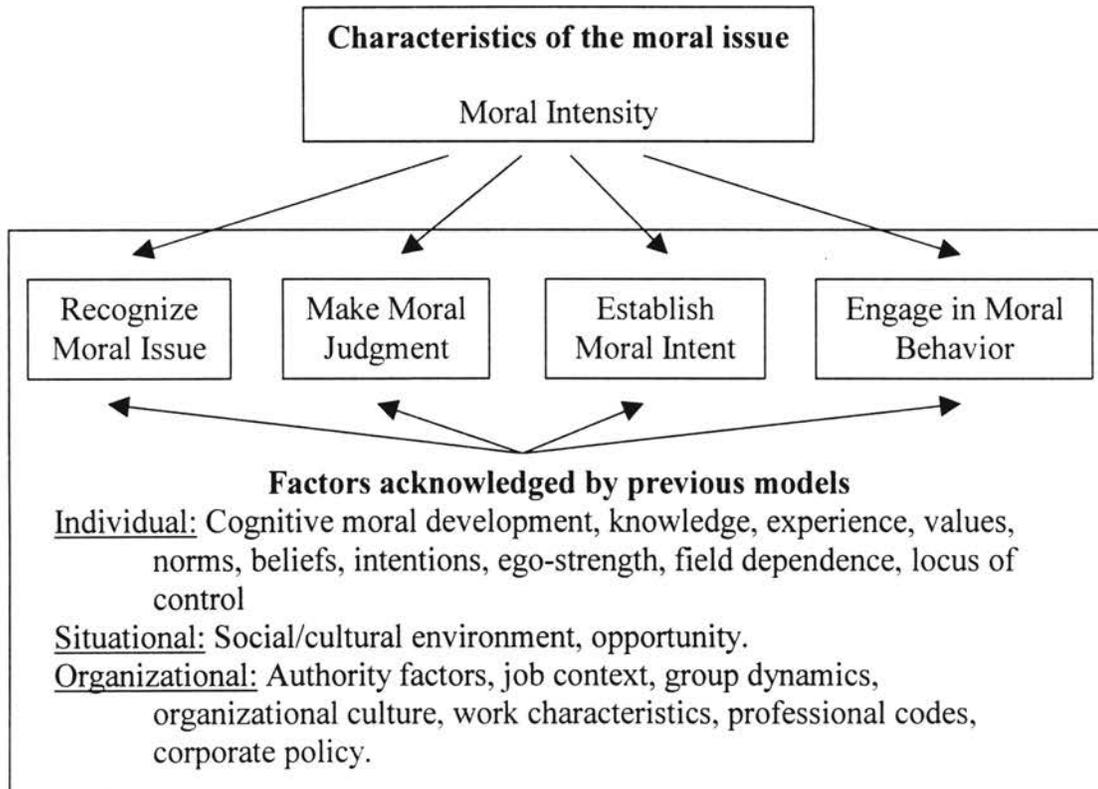


Figure 3. An Ethical Decision-Making Model (Adapted from Jones, 1991).

the ethics of a decision-making process. These components resembled, to some extent, the latent issues described by Reason's Model (Reason, 1990) and provided considerable insight into the individual processes that operate within the value system of individuals. These components are not generally addressed in typical decision-making models. See Table VII. According to Frey, in qualifiable terms, the MI of a given issue or dilemma will be determined along a scale of high to low depending upon the descriptors reflected in Figure 4. For instance, if there was a lengthy amount of time between the point a decision is made and the time the results from that decision could be expected (TI), the moral intensity (MI) of the issue could be said to be HIGH. Also, if the

TABLE VII  
MORAL INTENSITY ELEMENTS

Acronym	Explanation
MC	Moral Consequences – magnitude or potential seriousness
SC	Social Consensus – The potential to which others will agree that a given action is unethical.
LE	Likelihood of Effect – Probability that an action will result in negative consequences.
TI	Temporal Immediacy – The amount of time between a decision and its resultant effect.
CE	Concentration of Effect – The number of people effected by the decision.
PR	Proximity – The social distance between the decision-maker and the effected people

consequences of a decision were not likely to be negative, the MI could be said to LOW.

“As the intensity or severity of a component increases, the perceived total ‘ethical heat’ of the issue increases.” (Frey, 2000, p. 182) The MI concept has been used to develop a testing instrument similar to the Defining Issues Test (DIT) the Center for the Study of Ethical Development at the University of Minnesota has been using over the last 25 years. Frey points out that the experimental results of the MI instrument have produced similar results to existing moral testing instruments available but does not mention them by name.

Other models and processes exist that are designed to facilitate, or better understand the decision-making process within large organizations. One such model is discussed in a paper by Sunstein and Ullmann-Margalit (1999) titled *Second-Order*

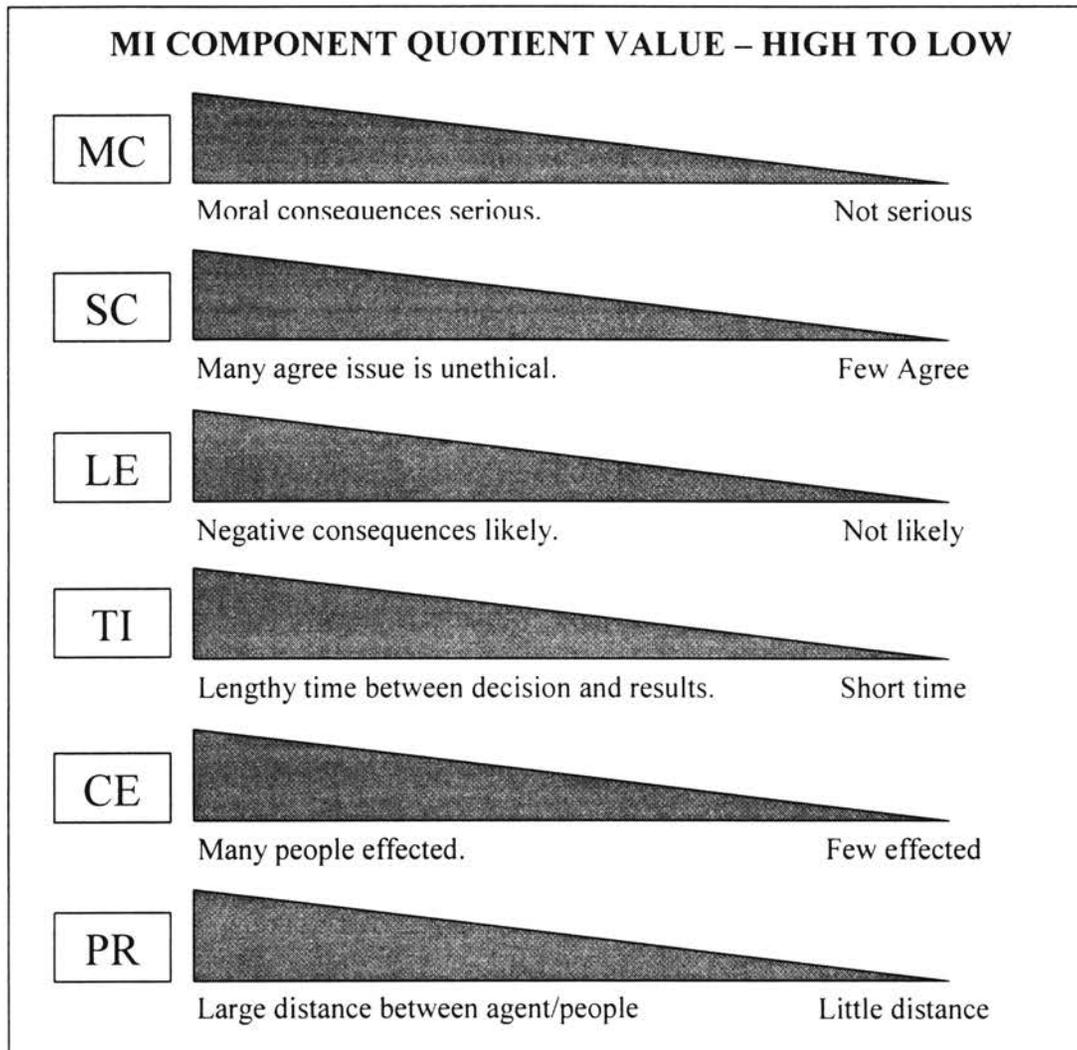


Figure 4. MI Component Quotient Value.

*Decisions.* Their work is principally designed to provide insight into different modes of decision processes that involve the delegation of decision responsibilities within large and complex groups or organizations. Much attention is given to calculated risk and potential benefit in the ethical deliberations necessary to formulate decisions (1999). Anita Callahan introduced a more mechanical approached to decision-making ethics for

engineers by suggesting that a mathematical approach to formulating ethical decisions would provide more consistent and reliable results (Callahan, 1992).

Another approach to risk management that encourages ethical decision making is addressed by Morgan (1993) in a Scientific American article that discussed the effects of poor policy making and how the results to society can be enormous, if not catastrophic (Morgan, 1993). This article transparently addresses the phenomenon of latent issues that will be discussed later in this paper.

### Professional Code of Ethics

Codes of ethics, professional ethics, and decision-making ethics are synonymous within professional disciplines. The roots of these concepts were found within the definition of the word "professional," which is defined by Merriam-Webster's Collegiate Dictionary (1998) as "...characterized by or conforming to the technical or ethical standards of a profession." The term professional in our culture has been used in a variety of ways, usually being applied to a particular branch of knowledge, or learning, that is used in the assistance of others. However, the general definition for a professional was best understood by defining it in contrast with non-professional occupations.

1. Education – Qualification for entry into a professional field of endeavor usually requires an extensive amount of formal education. Because a professional's knowledge in the particular discipline requires a considerable understanding in theory this education is based more on the intellectual aspects of the discipline as opposed the development of skills.

2. Dependency of society – The skills and knowledge usually associated with professionals generally support the greater well being of society at large. Examples are lawyers, engineers, scientists, and physicians.
3. Exclusivity of professional services – The practitioners of professions usually exercise a monopoly, granted by society at large, over the providing of the appropriate services. Society generally accomplishes this in two ways. First, only those individuals who have received education and a recognized degree from an accepted institution recognized for developing professionals in a particular discipline will be allowed to hold the title of professional. Second, society can adopt legal sanctions for anyone who practices a particular professional discipline with an appropriate license.
4. Professional autonomy – Professionals generally have a high degree of specialized knowledge within a particular discipline. This grants them considerable autonomy in the practice of their profession. The rationale for this autonomy is that the professional is recognized as a singular source of information, creativity and execution of a particular skill and society will generally defer to that knowledge.
5. Professionals held to a higher standard – The autonomy enjoyed by professionals carries with it a potential for abuse. To counter this potential and to assure society that they can also be granted a higher level of trust professional ascribe to a code of ethics that represents the moral theory their practice is based upon. These codes of ethics are generally developed

and monitored by professional societies who also provide oversight and enforcement actions for their members. (Harris, et al., 2000)

In a study of teaching as a profession, Davis (1999) referred to professionals as those individuals who participate in a particular field of endeavor for the purpose of serving a moral ideal. He likened professions to "...charities, educational foundations, and other altruistic organizations in being *designed to serve a moral ideal in a certain way*" (p. 46). Therefore, the title of professional is bestowed upon an individual who chooses to educate themselves appropriately for a specific field of endeavor and then subject themselves to the set of standards of conduct adopted by the profession to reflect a moral ideal (Davis, 1999).

Codes of conduct are universal in their application and are prevalent, to some degree, in all industrialized countries. A study by Farrell and Cobbin (1999) of Australian codes of ethics reflected similar views with regard to purpose and construct. However, the study presented a unique differentiation of the different types and purposes of professional codes of ethics. The study essentially identified three different types of codes:

1. Inspirational code – This type of code describes an ideal set of behaviors that individuals who practice that profession would be expected to aspire to.
2. Educational code – This type of code presents instruction and explanation with regard to the accepted behaviors for the profession.

3. Prescriptive code – This type represents one of the more prevalent types of codes in that it establishes a set of regulations that provide guidelines for the profession’s accepted behaviors. (Farrell & Cobbin, 1999)

The differences of different approaches to codes-of-ethics notwithstanding, they shared a common purpose and objective: to define, establish, and assure a common set of ethical standards and behaviors that reflect the commitment of the profession. In 1994 the American Society for Public Administration (ASPA) adopted a new code of ethics designed to better reflect the Society’s commitment and responsibility to public welfare. For years the institutional code of ethics contained a mix of priorities and expectations that were confusing to both its practitioners and the public they served. The newly adopted code was greatly simplified and reflected the Society’s commitment to the public welfare. It also included a practical approach to decision-making essentially stating “Administrators decisions cannot be determined to be ethical simply based on the content of their final actions but by the thorough consideration that they give all legitimate values in formulating the best possible decision when various values compete.” (Van Wart, 1996, p. 528)

One of the manifestations of applied ethics is the emergence and proliferation of professional codes of ethics. These codes are sets of moral theory that have been adopted by specific professions to act as guidelines for professional behavior, client interaction, the general conduct of business (Schofield, 2000). Codes of Ethics, as established by specific professions become the foundation for decision-making ethics within that discipline.

In spite of the intent to influence the behavior of professionals by the establishment of a set of standards, research indicated that it is not always successful. Wueste (1999) discussed the inherent strain that occurs between practical and professional ethical realism and equated it to the same type of tension that exists between practical and professional realism in the legal discipline (1999). Higgs-Kleyn and Kapelianis (1999) found in a study of South African professionals that although most believed their profession needed codes of conduct and supported their intent, felt that many of their peers would often contravene the codes depending upon the circumstances. They found this was particularly true with respect to attorneys. They found that contravention of codes did not seem to be effected by the presence of a threat of extreme penalties. Considering the frequency of contravention without regard to the possibility of being sanctioned by the profession they believed that professionals who chose to contravene their codes felt there was a low likelihood of being detected. Clearly, professional codes of conduct are important in maintaining a high standard of ethical behavior in the business community. However, the suggestion that frequent contravention of these codes by some professionals is an indication that a higher standard of implementation and oversight by the professional societies is needed (1999). In a study of engineering ethics, Callahan observed that basically engineers were expected to operate in an environment that was based on at least two value systems: (1) their personal code of morality (ethics) and (2) the professional code of morality (ethics). Callahan further noted that the best of all environments would be where one of the two codes would be a natural subset of the other code or, at least, an intersection of the two codes in

a way that mitigated the potential conflict between the two (Callahan, 1992; Fritzsche, 2000).

The aviation and aerospace industry has not yet been recognized as a discipline unto itself. In actual terms this industry is seen as a product and combination of a variety of recognized professional disciplines. The codes of ethics that are a part of these professional disciplines are virtually the only semblance of such a recognized practice within the industry. However, this does not necessarily indicate a similar situation with the issue of aviation safety, which is one of the more prevalent attitudes that can be found in the industry. "Safety" has always been at the forefront of U.S. aviation, which has become the standard within the international aviation community.

## Decision Models

### The Ethical Process

The Ethical Process (Brown, 1996) is a seminar-based program developed for individuals and groups who have determined they need to develop a process for improving their decision-making skills. It was designed to help its participants conduct an ethical analysis of very complex and controversial issues. Brown prepared the participants by presenting some of the basics for ethical thought by presenting early Greek philosophers as the roots of ethics. He then presented the three fundamental ethical philosophies discussed earlier in this chapter to contrast the different approaches individuals generally apply in the process of assessing issues and making decisions:

1. The Ethics of Purpose – This is essentially teleological approach to ethics wherein the agent unilaterally determines what the end of a proposal should be. Once having determined the end state of a proposal, the agent will consider any interim proposal that supports the ultimate goal to be supportive and those that do not to be undesirable. Basically, this is a manifestation of "the end justifies the means."
2. The Ethics of Principal – This form of ethics is essentially a deontological approach, which states that the implied principle of a proposal can be stated as having universal significance as a moral law and, therefore, applicable to all.
3. The Ethics of Consequence – This is a thinly masked manifestation of utilitarianistic philosophy. This approach is solely focused on the outcome of a given proposal and seeks to weigh the positive and negative effects on the individuals who are involved. (Brown, 1996)

The next step in Brown's The Ethical Process after describing the three general philosophies was to provide participants with the tools and activities designed to correctly identify the various elements that exist within an issue. To do this he described five progressive steps to be taken to breakdown issues into their ethical components:

1. Proposal – The first step is to correctly identify the core object of the issue or decision.
2. Observation – The second step is to isolate the facts within the issue that directly support the proposal.

3. Value Judgment – The third step is to assess what reasoning was used to connect the facts with the proposal.
4. Assumption – The fourth step is to establish the context within which the proposal, the observed facts, and the connecting values can be logically linked.
5. Alternative Views – The last step is consider other ways of defining the proposal that would achieve the same core objective. (Brown, 1996)

These steps were designed to bring the participant(s) to the level of understanding of the ethical components within a decision that they are then able to enter into effective argumentative dialogues and successfully debate the issues. Brown's process applied similar concepts described in Vidaver-Cohen's (1998) research that defines the use of moral imagination in organizational problem solving using a sociological perspective of values and beliefs (1998). Brown's premise was that only until the participants are fully aware of all of the issues and how they relate from an ethical perspective can they be open to other, perhaps more effective, solutions (Brown, 1996).

### Reason's Model

One of the principal tools available to accident investigators in the aviation industry is often referred to as Reason's Model. This model is the result of considerable research conducted by Reason in an effort to better understand and explain how accidents are the terminal manifestation of a series of decisions made at progressive levels within an organization. Reason's research ultimately described the cognitive processes that are involved in various types of decision-making with emphasis on how errors are made.

Reason established three basic types of errors or mistakes and associated them with a “skill-rule-knowledge” framework of cognitive actions described by researchers Rasmussen and Jensen in a 1974 study (Table VIII). Skill-based (SB) errors or mistakes are identified as those that occurred as a failure of monitoring. These errors are generally considered to be high level errors made with the presumption of what is thought to be accurate but which, in fact, is erroneous. SB errors occurred in areas of over confidence

TABLE VIII  
SKILL, RULE, AND KNOWLEDGE FRAMEWORK

Performance Level	Error Type
Skill-based level	SB (Slips and lapses) mistakes
Rule-based level	RB mistakes
Knowledge-based level	KB mistakes

Note: Source – Reason, p. 56.

when individuals have built-in expectations based on empirical experience with the same or similar factors. Because of the habitual nature of SB errors the individual is not likely to become conscious of them until the results have run their course. Rule-based (RB) errors or mistakes are associated with problem-solving behaviors. Often times, when confronted with problematic issues, an individual would attempt to look for a match, or pattern, that would associate with a previous set of circumstances. Reason strongly emphasized the value of the Generic Error-Modeling System (GEMS) in understanding

how errors are injected into processes at all levels of performance (Reason, 1990, pp. 62-63). The GEMS model recognized the strong psychological influences at work in the human mind to establish a pattern when confronted with complex issues that need a resolution. In RB errors and mistakes this desire to establish a pattern caused the individual to overlook obvious issues that did not fit the perceived pattern. Once the pattern was established in the mind of the individual they applied a correction, or “rule,” as a solution to the problem. The results were an action to resolve a problem that was not been correctly understood. Reason reduced the concept of RB errors and mistakes into two basic categories: (1) the misapplication of good rules, and (2) the application of bad rules.

Knowledge-based (KB) errors or mistakes were also a function of problem solving and had roots in two aspects of human cognition. The first was referred to as bounded rationality which is defined as a condition wherein individuals clearly know what they want and will choose whatever path is appropriate to achieve it. The Subjective Expected Utility Theory (SEU) was defined by economists and statisticians to help better understand the process of decision-making (Simon, 1983). This theory established four assumptions that best defined how bounded rationality manifests in decision makers:

1. Decision makers have a clear vision of their objective and its priority.
2. They have a complete understanding of all the alternative strategies available to them and have prioritized each in order of most effective.
3. They understand the consequence of each strategy and believe that each would ultimately achieve their original vision.

4. They will choose among their strategies, and others if necessary, to achieve their original vision. (Simon, 1983)

The second aspect of human cognition that is prevalent in KB errors and mistakes was determined to be the fact that information about a problem that was being considered was often incomplete and/or inaccurate. Reason identified a number of "pathologies" that were associated with and helped define KB errors and mistakes:

1. Misperceiving the problem.
2. Not considering relevant issues of the problem.
3. A tendency to look for and expect confirmation.
4. Overconfidence.
5. Possessing a biased review of the plan for resolution.
6. Illusory correlation (seeing what is expected)
7. Halo effects. (Reason, 1990)

Although Reason's Model was designed to be used for accident investigators in determining the progression of decisions that lead to an incident or accident. It has considerable implications in the pathology of decision-making without regard to accident investigation. The Model (Figure 5) basically consists of five primary categories of events. The first, *Decision makers*, primarily focused on the decisions that were made at a high level in relevant organizations. Typically, it referred to positions within the corporate management structure and those responsible of creating and implementing policy. It can also refer to designers and architects of process. Reason emphasized the identification of decision makers as potentially at the root of most accidents and is not meant to be a criticism of wrong doing. It just simply acknowledges the fact that high

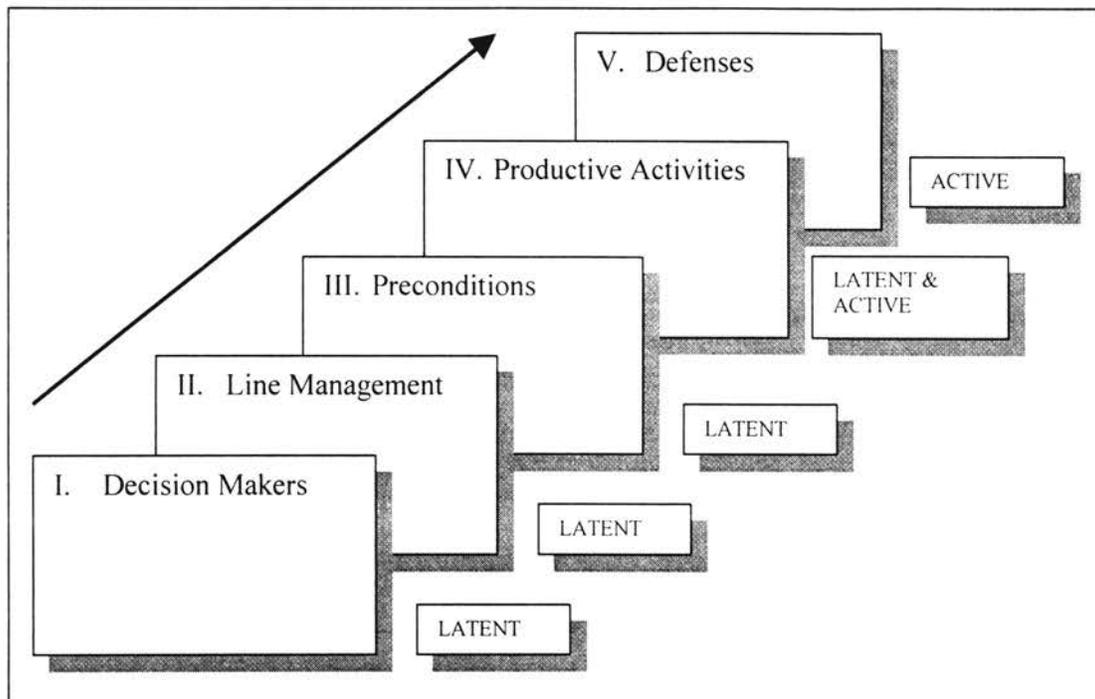


Figure 5. Reason's Model (Adapted from Reason, 1990, pp. 200-202).

level decisions can be extremely vulnerable to error given the scope and range of their intent and the complexity of issues that they often represent. The second category was focused on *Line Management*. While it was argued that line managers occupy positions and manage organizations that are a direct result of corporate policy decisions, they were in the unique position to interpret, rightly or wrongly, those policies and decisions in the execution of their responsibilities. Therefore, this became an issue of competence and was clearly a component of error progression.

The third category was referred to *Preconditions*. This category is probably the more difficult to understand. It essentially addressed a latent state of a variety of issues that manifest as a result of the first two categories. Reason referred to these as

psychological precursors that create the potential for a multitude of unsafe acts. They were better understood if explained as catalysts that served to accelerate, foster, encourage, and enhance those issues that began at the decision-makers and line management level. The fourth category was technically referred to as *Productive Activities*. The term was meant to address the action that resulted from the execution of the first three categories, which represented unsafe acts. An unsafe act in and of itself is not an accident. It must be defined in relationship to the hazard it directly addresses. As an example, choosing to not wear a seat belt in an automobile does not constitute an accident. But the choice to not wear the safety belt is a productive activity (unsafe act) because it virtually eliminates a critical safety component for the occupant should they experience an unavoidable circumstance.

The final category is referred to as *Defenses*. These are those items, issues, procedures, and systems that represent the last opportunity to avoid an accident or incident. In the above example where the choice to not wear a seat belt was the Productive Activity, the seat belt itself is the *Defense*. The actual defense category can be layered with multiple barriers designed to prevent accidents. This is often referred to as redundancy and geometrically increases the overall safety factor (Reason, 1990).

Although Reason's Model has been designed to be applied by accident investigators as they attempt to better understand the progress of decisions and acts in the ultimate occurrence of an accident, it also possessed considerable utility in examining the construction, initiation and affects of a corporate decision-making processes that may or may not lead to accident or incident.

One of the more important outcomes of Reason's research into the progressivity of decisions to accident/incident was the development of two primary categories of error: active errors and latent errors (Table IX). These different categories became significantly important in attempting to develop a full understanding of the corporate decision-making process. Active errors are those mistakes that are made in the "front-line" environment of

TABLE IX  
ACTIVE AND LATENT ERRORS

Error Category	Description
Active	Effects are immediate. Causality is readily apparent and traceable to a source or multiple sources.
Latent	Effects are not immediate. Latent errors may lie dormant within a system for lengthy periods of time before they manifest.

complex operations. As an example, in the aviation community this environment is associated with actual flight operations, pilots, air traffic control-room operations, and air traffic controllers. The aerospace industry the Space Shuttle Challenger accident that occurred on January 28, 1986, has become the ultimate example of latent errors progressing to disaster. Problems with the O-ring design in the Solid Rocket Booster (SRB) system were documented as early as 1977, nearly four years before the first shuttle

flight and nine years before the actual accident. The active fault in the failure of the Challenger was the O-ring operation at temperatures below specification limits. The latent failure was an enormous amount of poor communications, incomplete decisions, and misaligned agendas (Vaughan, 1996, Preface).

Reason stated that latent errors contained the highest potential for threatening complex systems. The consequences of these latent errors, or issues, become the focus in a process that would encourage decision-makers to be more deliberate in formulating decisions. The purpose would be to have managers' decision processes be more of a consideration of *managing consequences* as opposed to affecting active results (Reason, 1990).

#### Hosmer's Levels of Managerial Responsibility

Although not a decision-model, Hosmer's Levels of Managerial Responsibility provides a different perspective into the purpose of Reason's Model (Figure 6). Hosmer established a progressive series of responsibilities ranked in order of a process that would typically begin with the planning stage and move toward the execution phase of an organizational initiative (Figure 6). This closely approximates Reason's Model in that the progression of responsibility begins with the *Decision Makers* and moves toward the points of contact with the operations where latent issues begin to manifest (Figure 5). In Hosmer's schematic the moral responsibility level equates with Reason's *Decision Makers* and progresses downward to the operational levels of responsibilities.

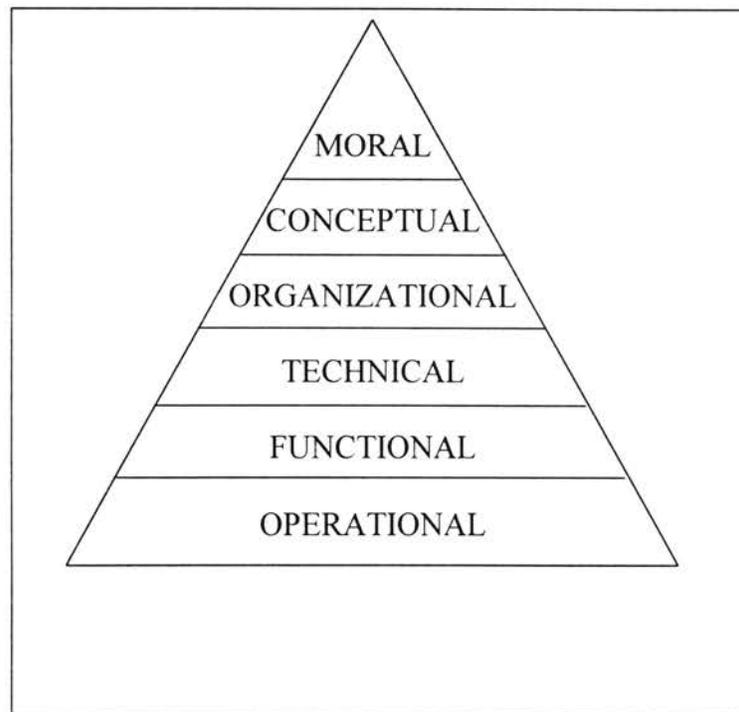


Figure 6. Levels of Managerial Responsibility,  
(Adapted from Hosmer, 1994, p. 195).

Hosmer used this model to explain the failure of the Exxon Corporation in managing the Exxon Valdez oil spill disaster that occurred on March 22, 1989. The disaster began as the Exxon Valdez, a ship in the "supertanker" category being nearly 1000' long and weighing over 280,000 tons, departed the Alaskan port of Valdez loaded with crude oil. After a series of poor judgment calls and lack of professional behavior on the part of the ship's captain, the Exxon Valdez ran around on Bligh Reef just off of Busby Island. The ship's hull was penetrated during the grounding and approximately 27% of its total cargo (40.7 million gallons of crude oil) escaped into Prince William Sound. This represented the worst accident ever encountered by the North American oil industry and one of the most profound ecological disasters our culture has had to face.

Estimates of the loss of wildlife in Prince William Sound include 60% of the sea otter population, 35% of the sea bird population and 30% the total bald eagle population. The closest estimate of the costs for cleaning up the disaster including clean-up expenses, legal defense, criminal fines, and claims for resource damage, compensation and punitive award settlements was nearly \$9 billion. Clearly, this was an industrial accident of major proportions. Hosmer studied the sequences of decisions (Table X) in a process similar to the chronological progression described by Jim Reason in the development of Reason's

TABLE X  
CORPORATE RESPONSIBILITIES FOR THE  
EXXON VALDEZ ACCIDENT

Responsibility	Definition	Exxon's Behavior
Operational	The level at which point-of-manufacture, point-of-service, and financial transactions are executed.	The company had placed the responsibility for a significant capital investment (the Exxon Valdez) and its formidable shipment of crude oil in a captain who had a history of personal problems and his support staff that were only moderately experienced.
Functional	The level at which the operational responsibilities, defined above, are directed.	As a result of an Exxon cost-reduction program, tanker crew sizes were cut by 50%. Valdez's crew had complained about fatigue. Cost cuts also affected emergency equipment at Port Valdez.
Technical	The level at which informational, individual, and technologies for higher efficiencies are developed.	Risks assessments had been conducted regarding shipping dangerous cargos but were never given much corporate exposure.
Organizational	The level at which company strategy is implemented.	Communication processes in Exxon were insufficient given the corporation's size and complexity.
Conceptual	The level at which company strategy is formulated.	Poor planning around the fluctuating cost of crude oil had left Exxon in an exposed financial posture necessitating corporation-wide cost cutting initiatives.
Moral	The level where corporate leadership defines organizational values, vision, and responsibilities.	Exxon had no statement of organizational values. Leadership stressed profits at the expense of duties and responsibilities.

Model (Reason, 1990). Consequently, the latent issues set into action by Exxon corporate and employee decisions become visible from a different perspective. Hosmer outlines them by employing the levels of the managerial responsibility model (Figure 6). He made the point that the devastating effects from the grounding of the Exxon Valdez was not necessarily a direct result of the corporate actions summarized in Table X. Instead, he suggests that Exxon's choices to put the focus on profit margins and corporate stability made the incident more likely (Hosmer, 1998). "No one at any of the levels of managerial responsibility felt that it was their duty to resolve the potential moral problems brought about by those changes as attentively as they worked upon the obvious financial problems" (Hosmer, 1998, p. 117). This became a classic example of the affects of latent issues in the context of Reason's model (Reason, 1990).

#### Aircraft Accidents and Latent Issues

In an industry such as aviation/aerospace the most visible event that reflects on the quality of their product is an accident or incident. However, the events that result in loss of life and/or significant property damage tend to get the most exposure to the public from the United States' media industry. The media's primary interest is in sensational press coverage that raises the anxiety level of the public, which in turn, holds the attention of the public and forces their dependence on the media for more information. Aviation accidents, as a rule, generally involve a series of extremely complex events that, to some degree, all interact to produce the accident. The media, however, does not have the inclination or time, to report the event with the same degree of deliberation and caution that a trained professional accident investigator would use. Their strategy is to get the

story quickly and present it to the public with the most viable description available. This has the effect of encouraging the public to 'jump to a conclusion' regarding the accident. This results in enormous pressure on organizational entities that are involved in these accidents to address public concerns for fear of losing their trust and, ultimately, their business (Gray, 1996).

The following examples of aviation and aerospace accidents provide only summaries of the formal investigation packages. Elements of each accident and the relevant associative events and issues that relate to the notion of latent effects are emphasized for the purpose of illustrating their potentially disastrous effects.

#### Space Shuttle Challenger – January 28, 1986

The initial space shuttle flight, Space Transportation System – 1 (STS-1) occurred on April 12, 1981. Essentially, STS-1 was a proof of concept mission that was flown by the Space Shuttle Columbia. It proved to be an extraordinarily successful system. Over the next 57 months there would be 24 successful shuttle missions before the fateful flight of the Challenger in 1986 (Presidential Commission on the Space Shuttle Challenger Accident, 1986).

The design, development and operational implementation of the space shuttle program constituted an extremely complex project. Early in 1970, NASA presented President Nixon with three options with regard to future program development. The Apollo Program had completed its objectives and it had become necessary for the U.S. to capitalize on its new technological assets by developing a new national goal in space. Option 1 was an aggressive \$8-10 billion annualized program that involved a manned

Mars mission, a large space station in Lunar orbit, and an Earth orbiting space station. Option 2 was an \$8 billion annualized program that was designed to be an intermediate version of Option 1 and retained the objective of a manned Mars mission. Option 3 was a significantly less costly option than the first two, \$4-\$6 billion per year, and only included the development of an Earth orbiting space station with a Space Shuttle system designed to shuttle between Earth and the station. Citing national economic issues and concerns President Nixon chose Option 3 but deferred development of the space station until the space shuttle system was developed and operational.

Few industrial or aviation related accidents have received the attention, criticism and outpouring of emotion from the public and congress as the Space Shuttle Challenger accident on January 28, 1986. The spectacular photograph of spiraling contrails from out-of-control SRBs and descending trajectories of the smoking remnants of the Space Shuttle Challenger have become an icon for the costly risks that are built into the development and operational activities of the aviation and aerospace industry. The technical reasons for the Challenger accident have been formally recognized as a failure of an O-ring component designed to seal the Solid Rocket Booster (SRB) canister system from the extreme internal pressures from the firing of the solid rocket motor. However, the canister sealing process used with the SRBs had been an engineering controversy since the original design was proposed. The circumstances surrounding the evolution of the concerns associated with canister sealing of SRBs have progressed through the research and development of the SRB system, the flight readiness demonstrations, and, ultimately, their operational use on the space shuttle system. This situation was a case

study in itself of the formation of latent issues, which compounded over time, produce horrific results.

Vaughan (1996), in The Challenger Launch Decision, determined to go beyond the Presidential Commission established to look into the Challenger Accident. The author particularly focused on the decision-making processes within NASA and its prime contractors in an attempt to pursue the root cause of the accident. Although the focus of the book was on NASA and this country's space program, the elements of the author's research provided important insights into very similar issues faced by the aerospace industry in general. The preface of the book stated:

The practical lessons from the Challenger accident warn us about the hazards of living in this technological age. We learn that harmful outcomes can occur in organizations constructed to prevent them, as NASA was, and can occur when people follow all the rules, As NASA teleconference [51-L launch decision meeting] participants did. In contrast to conventional interpretations that focus on managerial wrongdoing, the book reveals a more complex picture that shifts our attention from individual causal explanations to the structure of power and the power of structure and culture—factors that are difficult to identify and untangle yet have great impact on decision making in organizations. For this reason, the revisionist history and sociological explanation presented here are more frightening than the historically accepted interpretation, for the invisible and unacknowledged tends to remain undiagnosed and therefore elude remedy. This case directs our attention to the relentless inevitability of mistake in organizations—and the irrevocable harm that can occur when those organizations deal in risky technology. (Vaughn, 1996, p. xv)

Vaughn introduced the concept of “amoral calculation” in her book raising the question of whether technical managers and aerospace personnel were “...knowingly violating safety rules in order to stick to the launch schedule?” (Vaughn, 1996, p. 38). Basically, by extrapolating Vaughn's use of the term in context of progression to the Challenger accident and including a more generic explanation of the circumstances, it

meant the act of making a decision without consideration of any moral implications. It involved a perceived full understanding by the agent of the technology involved, the level of risk associated with its use, and a belief that “worse case scenarios” were essentially unlikely.

The Challenger accident was an extraordinarily complex series of events. On February 3, 1986, President Reagan signed Executive Order 12546 which established a Presidential Commission to look into the Challenger accident, determine its causes and recommend appropriate initiatives to assure the effectiveness and safety of the United States’ space program. He appointed William P. Rogers to head that commission. Rogers had served as Secretary of State under President Nixon (1969-1973) and Attorney General under President Eisenhower (1957-1961). At the time of this appointment he was an attorney in private practice. The Commission ultimately became known as the Roger’s Commission and the Roger’s Commission Report. The Report is extremely detailed and contains information, interviews, and chronologies, historical perspectives that could have any arguable association with the Challenger accident (Presidential Commission on the Space Shuttle Challenger Accident, 1986). However, for the purpose of this study only a select few of the events were chosen to be presented. These events clearly point to the effects and manifestations of latent issues on the ultimate outcome represented by the accident.

Flight History – On January 28, 1986 at 11:38 a.m. EST, the Space Shuttle Challenger (STS 51-L) was launched from Cape Canaveral, Florida with a crew of seven: one commander, one pilot, three mission specialists, and two payload specialists on

board. The mission was scheduled for a seven day flight during which two satellites would be released and one retrieved. Many other experiments were also scheduled including the *classroom in space* activity to be delivered by Astronaut/School Teacher Christa McAuliffe. See Table XI for the payload inventory for STS 51-L. Temperature at the launch site had dropped into the low twenties during the hours before dawn.

TABLE XI  
SPACE SHUTTLE CHALLENGER, STS-51-L PAYLOAD

Item	Description
Tracking and Data Relay Satellite - B	NASA communication satellite
Spartan-Haley Satellite	Satellite designed to observe Haley's Comet
Miscellaneous Mission Experiment-Support equipment	Fluid Dynamics Experiment Phase Partitioning Experiment Radiation Monitoring Experiment Teacher-in-Space Project Shuttle Student Involvement Program

Considerable amounts of ice had collected at various sites around the launch platform.

At launch time the ambient temperature was 36°F. Seventy-three seconds after launch the Space Shuttle Challenger, still in its launch configuration attached to two SRBs and the large external tank was completely destroyed. At the point of destruction the Challenger had reached 46,000 feet and attained a speed of 1.92 mach. The entire mission and crew were lost.

Presidential Commission Findings – As previously stated in this study, the Roger's Commission Report provided an exhaustive description of the entire investigation into the Challenger accident. It began with a global view of the space shuttle system and potential failure points and then through a process of careful elimination closed in on the most probable cause of the accident. The following is a list of events that related to the latent issues surrounding the O-ring controversy:

1. January 9, 1978 – An internal NASA memo was generated as a result of a suggestion that the standards around O-ring material acceptance criteria be relaxed. It identified the sensitivity of O-ring material and restated the need to handle it within pre-established procedures during installation. The memo essentially argued against the relaxation of any criteria and stated that to do so would increase the probability of hot gas leaks and, consequently, catastrophic failure of the system.
2. January 19, 1979 – An internal NASA memo between the same parties in the January 9, 1978 memo again addressed the O-ring concerns. This memo took exception to a position taken by Thiokol (SRB manufacturer) regarding the adequacy of the design of a clevis joint that is used to assemble the SRB canisters into a rocket motor cylinder. The clevis joint depended upon the O-rings to internally seal the hot gases from ignition. The memo provided rationale for the position that the joints were not satisfactory and Thiokol should have been held accountable for resolution.
3. November 24, 1980 – An internal status review form called "SRB Critical Items List," identifies the potential for hot gas leakage at SRB case

assembly joints as a result of O-ring failure. It identified the consequences of such a failure as the probable loss of the mission, vehicle, and crew.

4. November 1981 – STS-2 (Columbia) flew a mission primarily designed to test the manipulator arm installed in the payload bay. A fuel cell failure cut the mission short by 3 days. However, after NASA crews had recovered the SRBs from the Atlantic and Thiokol engineers begin to disassemble them in preparation for reuse they discovered the first evidence of O-ring erosion. The putty that sealed the clevis joint from the inside and is meant to protect the joint from the hot gases had deteriorated due to the internal pressure and exposed the O-rings to the gases.
5. February 28, 1984 – An internal NASA routing slip discusses the O-ring erosion discovered on the recently completed STS 41-B mission and suggested that humidity and temperature may have been factors. The routing slip identified this as an "urgent" situation and needed to be addressed.
6. January 24, 1985 – Prior to the launch of STS-51C the temperature in the vicinity of Cape Kennedy had been below freezing several times before the actual launch date. Launch had been delayed due to cold but the NASA and Thiokol engineers never indicated there might be a problem with the cold affecting the O-ring material. After launch and the recovery of the SRBs from the Atlantic, Thiokol engineers discovered the first real example of O-ring erosion. Although the ambient temperature had been 66°F at launch, they determined that the O-ring temperature had been 53°F

as a result of several days of freezing temperatures. Thiokol engineers reported their finding as protocol required and a subsequent review was conducted. The results was that Thiokol and NASA ultimately determined that the performance of STS 51-C was consistent with their baseline data and that because the launch occurred at "worst case" temperature scenarios for the Florida launch site the condition was acceptable (Vaughn, 1996).

7. July 17, 1985 – A trip report filed by a NASA official from Washington and written to the Associate Administrator for Space Flight described a visit to the Marshall Space Flight Center in Alabama. The subject of the trip was to discuss the growing concern with O-ring erosion on the SRB system. The author of the report accurately described the empirical evidence from recent flights and the engineers concern with the O-ring material. The argument was presented as a resolution for the problem but then stated that redundancy existed for the potential O-ring failure during the most critical SRB ignition cycle. This served to reduce the criticality of the engineers' concerns in that a redundant feature did exist during the most critical phase of flight.
8. August 19, 1985 – A briefing was held by Thiokol management officials for NASA management personnel in at NASA headquarters in Houston, Texas. The O-ring issue was not originally on the agenda for this meeting but was added at the request of NASA. During the O-ring discussion the Thiokol engineers briefed on the causes of erosion and provided recommendations to prevent future occurrences. They recommended that:

(1) existing procedures with regard to material type and quality be adhered to, (2) further modeling be done to better understand the effects of environment, and that (3) tighter inspections should be made with increased pressurization tests to look for potential leakage. They further stated that basically the risk was “acceptable” if these recommendations were followed and the SRBs would be safe to fly.

9. August 22, 1985 – A Thiokol internal memo was generated to the SRB project engineer from the supervisor of SRB structural design. The subject was a recommendation to reduce the risks in “near term” shuttle missions while working to resolve the issues for the long term. It stated that there were several good options for “long term” but all would take years to accomplish. The thrust of the memo was to look for operational solutions that would not affect the robust space shuttle launch schedule (Vaughn, 1996).

Perhaps the most significant finding of the Roger’s Commission with regard to latent issues was the description of the teleconference between Thiokol and NASA personnel in discussing the environmental conditions at Cape Kennedy as they determined if the launch could be attempted. The teleconference was participated in by engineer teams and management personnel from both NASA and Thiokol in Utah, Marshall Space Flight Center in Alabama, and Kennedy Space Center in Florida. The Thiokol engineer team was concerned over the forecasted temperatures at the launch site in Florida. They discussed previous experience with SRB O-rings and suggested that one of the problems had been a temperature regimen that was not fully understood (see Table

XII). NASA engineers argued that the data was inconclusive due to the fact that erosion and blow-by had occurred at higher ambient temperatures than was currently the situation for STS 51-L in Florida. Thiokol admitted the discrepancies but stated those could have been associated with other factors, temperature notwithstanding. Thiokol engineers remained adamant that the launch be delayed until the temperature had risen to 53°F. NASA managers indicated that it seemed the Thiokol engineers were arguing for a

TABLE XII  
KNOWN O-RING DISTRESS ON SPACE  
SHUTTLE MISSIONS

Mission	Date	Joint Temp	Distress Type
STS-2	November 12, 1981	70°F	Erosion
STS 41-B	February 3, 1984	57°F	Erosion
STS 41-C	April 6, 1984	63°F	O-Ring Heat
STS 41-D	August 30, 1984	70°F	Erosion
STS 51-C	January 24, 1985	53°F	Erosion
STS 61-A	October 30, 1985	75°F	Blow-by
STS 61-C	January 12, 1986	58°F	Erosion
STS 51-L	January 28, 1986	28°F	Flame

different launch criteria than had already been established. The discussion continued and appeared to be heading for a deadlock. After three hours in teleconference Thiokol executives indicated a decision had to be made and commenced to vote on the launch decision. Three of the Thiokol managers voted for a launch but the manager over the

engineering division was still hesitant. The senior Thiokol manager then asked him to "...take off his engineering hat and put on his management hat." At this point Thiokol manager for engineering voted for a launch. The launch decision for STS 51-L had become unanimous (Vaughn, 1996, p. 316).

### Probable Cause

After months of interviews, investigation and analysis the Roger's Commission concluded that the cause of the STS 51-L accident was the failure of the pressure seal in the aft field joint of the Challenger's right Solid Rocket Motor. They stated that the failure was principally due to a faulty design that was perhaps less robust than it should have been considering the flight environment it was designed to operate within. Some of the factors adequately addressed were environmental temperature, physical dimensions, the character of materials, the effects of reusability, processing, and the reaction of the joint to dynamic loading. However, the Commission's report provided considerable information and criticism with regard to NASA's decision-making processes as it related to organizational structure. Lines of communication and accountability for critical information regarding technical issues and concerns were blurred and, in some areas, non-existent (Presidential Commission on the Space Shuttle Challenger Accident, 1986).

Latent Issues – Latent issues associated with the Challenger accident began almost ten years before the actual accident. Original concerns over the engineering design have been documented as early as January 1978. The Commission's findings discussed above show a progression that, in time, became less a critical concern of engineers and more of

a routine part of what was considered minor problematic issues around shuttle integrity. In retrospect, the clevis joint and O-ring issues gradually became a part of space shuttle terminology. There was a concern that many elements of the organization were aware of, and issues that many engineers had greatest misgivings over. However, the organization was not structured to correctly “hear” the problem and address it in a priority fashion. Other concerns such as: (1) an accelerated launch schedule, (2) a growing successful record as a launch platform and (3) a management structure that allowed itself to become more focused on mission objectives and taking system performance for granted, caused the latent issue of a poorly designed and tested component to become the most critical issue they would ever face. In Vaughn’s book this sequence has been referred to as the “normalization of deviance” (Vaughn, 1996, p.153).

#### Northwest Airlink Flight 5719 – December 1, 1993

This accident involved a Jetstream BA-3100 aircraft belonging to Express II, a regional air carrier operating under the name Northwest Airlink in a marketing partnership with Northwest Airlines. The aircraft departed Minneapolis, Minnesota on a routine scheduled flight to Hibbing, Minnesota. The aircraft collided with terrain while on approach to the Hibbing airport. There were no survivors among the two flight crew members and 16 passengers (National Transportation Safety Board, 1994).

Flight History – While perhaps unrelated to the incident and not mentioned specifically in the NTSB’s statement on probable cause, witnesses reported the captain appeared to be agitated and confrontational throughout the day and just prior to the flight.

On a flight earlier in the day the captain was scheduled to fly as a non-revenue passenger enroute to MSP where he was scheduled to pilot Airlink 5719. Before that flight departed he had an argument with a customer service agent (CSA) regarding who was responsible for obtaining his authorization to fly in a non-revenue status. The argument escalated to the airline's chief pilot and the CSA's supervisor. The captain refused to obtain his own authorization as suggested by the chief pilot leaving the CSA to act in his behalf, who ultimately allowed him to make the flight.

After arriving at Minneapolis and preparing for the Airlink 5719 flight one ramp service agent (RSA) reported that he had overheard the captain confronting the first officer over the first officer's conduct of the preflight inspection during which the malfunctioning landing lights were overlooked. Another RSA reported that the captain was reluctant to cooperate in the boarding of passengers for the flight, requiring the passengers to wait on the ramp until he had removed his coat and placed it in storage on the aircraft. After the passengers were boarded and the aircraft door closed the captain shouted from an open window in the cockpit that the aircraft was over gross by 130 pounds. This further delayed the flight while a passenger was identified to voluntarily deplane.

Airlink 5719 was scheduled to depart Minneapolis at 1810 CDT. It actually departed at 1852 CDT as a result of: (1) the late arrival of the aircraft on a proceeding flight, (2) the replacement of defective landing light bulbs detected by the Captain during a preflight inspection, and the need to remove one passenger due to a 130 pound over-gross weight situation. The weather observation for the arrival airport at the time of flight 5719's departure from Minneapolis indicated instrument conditions (IFR). The

following forecast for the arrival airport was contained in an airman's meteorological information (AIRMET), which had not been given to, nor sought out by flight crew: "...ceiling 800 feet overcast; visibility 3 miles, light freezing drizzle, occasional visibility 1 mile, light snow, fog; wind 180° at 12 knots" (National Transportation Safety Board, 1994, p. 4).

As Airlink 5719 approached the Hibbing airport the Duluth, Minnesota approach controller issued the current airport weather to the pilot and cleared him for an instrument landing system (ILS) approach to runway 31. This runway was experiencing a 12-knot tailwind component including accumulating snow and ice. The flight crew discussed the aircraft operating specifications, which discouraged tailwind landings with ice on the runway. With the aircraft at 8000 feet they asked for and received a clearance from the approach controller for a back course ILS to runway 13. They then set about to fly a 20 mile arc south and west of the airport to intercept the back course ILS to runway 13. The captain inquired of the first officer what altitude they could descend to after becoming established on the inbound radial? The first officer replied the descent altitude was 3500 feet. When the aircraft intercepted the inbound radial the pilot did not begin the procedural descent. The first officer inquired as to why and the pilot responded that he would remain at 8000 feet as long as possible. At the point the descent was initiated the aircraft was too high with a too high of a descent rate. Ultimately, Airlink 5719 descended below the normal ILS glide path and impacted the terrain approximately 10 miles from the runway. During the descent the flight crew did not indicate an awareness of the rapid descent as opposed to the normal procedural descent. They also did not

indicate a critical awareness of the ground proximity warning (GPWS) alerts that sounded just prior to impact (National Transportation Safety Board, 1994).

NTSB Findings – A summary of the principal findings by the NTSB follows:

1. There was no evidence that any failures associated with the mechanical systems, structural components, engine functioning contributed to the accident.
2. Weather phenomenon was not a direct or indirect contributing cause of the accident.
3. Air traffic services were in accordance with regulation.
4. The captain was executing the approach to Hibbing and chose to delay the start of the approach descent beyond the charted descent point. This necessitated a more rapid descent by the aircraft than would have been considered normal.
5. Effective crew coordination during the actual approach sequence was non-existent. The captain's actions resulted in confusion and inattention to relevant factors in the cockpit.
6. The crew was unaware that the aircraft had descended below the minimum descent altitude for the approach and impacted the terrain.
7. The captain had a record of poor crew coordination flight operations which airline management had never properly addressed. He had also been known to practice intimidation of flight officers, which had also not been addressed by management.

8. Airline management did not have properly developed procedures to assure effective oversight in the training and certification of flight crews for their aircraft.
9. The NTSB found that the FAA did not provide adequate guidance to FAA inspectors in the distribution of critical safety information to the airlines.  
  
(National Transportation Safety Board, 1994)

#### NTSB Probable Cause –

The National Transportation Safety Board determines that the probable causes of this accident were the captain's actions that led to a breakdown in crew coordination and the loss of altitude awareness by the flight crew during an unstabilized approach in night instrument meteorological conditions. Contribution to the accident were: The failure of the company management to adequately address the previously identified deficiencies in airmanship and crew resource management of the captain; the failure of the company to identify and correct a widespread, unapproved practice during instrument approach procedures; and the Federal Aviation Administration's inadequate surveillance and oversight of the air carrier. (National Transportation Safety Board, 1994, p. 70)

Latent Issues – The latent issues that can be identified in this accident are contained in four principal areas as defined by the NTSB.

1. The decision by Airlink management to not have a more critical policy and program for oversight of flight crew training encouraged a lack of discipline in the cockpit during a critical phase of flight.
2. The crew executed an unstable approach, against company policy, in instrument conditions and did not exercise critical cockpit discipline to assure that the safety of the aircraft and its passengers were protected.

3. The captain had developed a personal demeanor that did not encourage confidence in those who flew with him. Apparently he did not consider this to be a critical safety factor in cockpit resource management.
4. The lack of an FAA decision to emphasize the criticality of cockpit resource training in airline operations through its FAA airline inspector work force also carries a latent component for this accident. (National Transportation Safety Board, 1994)

#### Valujet Airlines Flight 597 – June 8, 1995

This accident involved a Valujet DC-9 schedule to operate from Atlanta William B. Hartsfield International Airport on a passenger flight to Miami, Florida. The flight had two pilots, three flight attendants, and 57 passengers on board. As Flight 597 began its takeoff roll the right engine failed, penetrated the cabin with debris, and subsequently caught fire. The crew halted the takeoff roll and the passengers deplaned via the emergency slides with only minor injuries. The fire subsequently consumed the aircraft, which was destroyed (National Transportation Safety Board, 1995).

Flight/Aircraft History – In July 1994, Valujet Airlines became aware that Turk Hava Yollari (THY), a Turkish aviation firm, had several DC-9-32 aircraft, engines and an inventory of parts for sale. The airline contracted with two independent consultants to travel to Turkey and conduct an assessment on the THY DC-9 inventory to determine if the equipment would be a cost effective acquisition for the company. The consultant's assessment was deemed favorable and Valujet began the acquisition process. They

contracted with Avionics and Aircraft Systems Engineering Services, Inc. (AAR) to provide technical oversight for the transition and integration of the equipment into the Valujet fleet. The formal agreement for sale and transfer of 9 aircraft, five spare engines, and 4,400 spare parts occurred on October 3, 1994. The engine (SN666966) that failed on Flight 597 was part of this sale. Before Valujet accepted any of the items included in this sale an onsite inspection was conducted that included:

1. All appropriate records/manuals were present, complete, and updated.
2. Accomplish a borescope inspection of all engines included in the sale.
3. Verification that any airframe damage had been repaired per specifications.
4. All aircraft possessed current FAA airworthiness certificates and directives.
5. Verifications that THY had accomplished all cabin configuration changes requested by Valujet.
6. Verification that all engines mounted on aircraft were serviceable according to specifications.
7. Verification that specifically identified service bulletins by Valujet had been complied with on specifically identified engines.
8. Verification that the fuel tanks had systematically been inspected for corrosion and microbiological contamination.
9. Assurance that aircraft cabins were properly maintained and clean.

(National Transportation Safety Board, 1995)

The AAR representative who conducted the verification process for Valujet at the THY facility in Turkey confirmed that all the inspections, documentation and servicing per Valujet's requirements had been accomplished and the appropriate provisions of FAA regulations and directives had been met. The nine aircraft, spare engines and inventory of parts were then flown back to the United States. Engine SN 666966 was stored at Valujet's logistics facility in Atlanta, Georgia. While at the Atlanta facility the engine was not subjected to 30-day humidity inspections required by the engine manufacturer. During January 1995 the engine was shipped to Miami, Florida where it underwent a modification of noise attenuation equipment after which it was then shipped to San Antonio, Texas to await installation on an aircraft. On February 9, 1995, after being kept in a preservation status for 106 days, engine SN 666966 was installed as the number two (right) engine on N908VJ. This is the aircraft that would be involved in the accident in Atlanta four months later.

On June 8, 1995, Valujet Flight 597 was scheduled to depart Atlanta Hartsfield for Miami, Florida with 57 passengers and five crewmembers. The aircraft was cleared for takeoff at 1908 EDT on runway 27R. Shortly thereafter, the pilot advanced the throttles to "full" and the DC-9-32 began its takeoff roll. As the aircraft began to accelerate a loud "bang" was heard by the occupants of the cabin as well as air traffic control personnel at the airport. The fire warning light for the right engine illuminated in the cockpit and, simultaneously, the aircraft following Valujet Flight 597 onto the runway reported that its right engine was on fire. The right engine had suffered an uncontained failure, ruptured fuel lines and caused engine debris to penetrate the cabin of the aircraft. A fire erupted both outside of the aircraft and inside the cabin. The captain of Valujet

Flight 597 brought the aircraft to a stop on the runway and commenced the evacuation process. All occupants were safely evacuated with only one serious injury and the fire ultimately destroyed the aircraft.

NTSB Findings – The following is a summary of the relevant findings of the NTSB:

1. The administrative issues that relate to the flight crew, the certification and operation of the aircraft was in accordance with all the applicable FAA regulations.
2. The uncontained failure of the right engine was the result of a metal fatigue crack in a stress redistribution hole in the 7<sup>th</sup> stage high pressure compressor (HCD) disk of engine SN 666966. The NTSB determined this crack was detectable during an engine overhaul procedure conducted by THY at their repair station in 1991.
3. THY did not have a thorough procedure established to methodically conduct an engine overhaul. If they had used a “process sheet” to track the required progression through the overhaul process the fatigue crack in the 7<sup>th</sup> stage disk would have likely be detected.
4. The FAA guidance with respect to engine overhaul and the degree of detail to be recording in maintenance records was insufficient. (National Transportation Safety Board, 1995)

### NTSB Probable Cause –

The National Transportation Safety Board determines that the probable cause of this accident was the failure of Turk Hava Yollari maintenance and inspection personnel to perform a proper inspection of a 7<sup>th</sup> stage high compressor disk, thus allowing the detectable crack to grow to a length at which the disk ruptured, under normal operating conditions, propelling engine fragments into the fuselage; the fragments severed the right engine main fuel line, which resulted in a fire that rapidly engulfed the cabin area. The lack of an adequate record keeping system and the failure to use “process sheets” to document the step-by-step overhaul/inspection procedures contributed to the failure to detect the crack and, thus, to the accident. (National Transportation Safety Board, 1995, p. 59)

Latent Issues – The major latent issues that can be identified in the investigation of this accident are as follows:

1. The depth of deliberation and consideration of Valujet corporate management in the decision to acquire a large number of aircraft and parts from a Turkish aviation concern.
2. The lack of required ‘humidity inspections’ of the engine while it was in storage at the Atlanta Valujet storage facility.
3. The lack of attention to detail, thoroughness, and follow-up exhibited by the THY maintenance facility during the engine overhaul process.
4. The FAA’s acceptance of less-than-thorough description of the regulations and guidance with regard to this type of engine overhaul. (National Transportation Safety Board, 1995)

### Korean Air Flight 801 – August 6, 1997

This accident involved a Korean Air Boeing 747-3B5B (747-300) aircraft known as Flight 801. It was flight planned from Kimpo International Airport, Seoul, Korea to the A.B. Won Guam International Airport, Agana, Guam on August 6, 1997. It had two pilots, one flight engineer, 14 flight attendants and 237 passengers on board. Flight 801 impacted the terrain while on approach to the Guam International Airport killing a total of 228 people. (National Transportation Safety Board, 1996B)

Flight History – The Captain of Flight 801 had been scheduled to take another flight from Seoul to Dubai, United Arab Emirates on the same day. However, due to inadequate rest he was not allowed to make the longer flight to Dubai and was subsequently rescheduled to take Flight 801 from Seoul to Guam.

Flight 801 departed Seoul at 2153 (Guam time) for the approximately three-hour flight to Guam. The captain was performing the flight responsibilities with the first officer in support. The enroute portion of the flight was uneventful for purposes of the accident investigation. At 0103 the co-pilot contacted the FAA Guam Combined Center/Radar Approach Control (CERAP) and informed them they were on their radio frequency at 41,000 feet, approximately 250 miles out from Guam. The CERAP controller contacted Flight 801 at 0105 and told them to expect an approach to Runway 6L and then cleared them for a "pilot's discretion" descent to 2,600 feet. At 0111 the pilot gave a short briefing to the crew on his plan for the instrument approach into Guam and, assuming the weather conditions at the airport were good, indicated that the last

phase of the approach would be in visual conditions. The crew began to set the aircraft up for descent and at 0113 left 41,000 feet descending to 2,600 feet.

During the next 10 minutes while the aircraft was in descent the captain was heard over the cockpit voice recorder (CVR) complaining about Korean Air corporate policy and crew scheduling procedures. At 0121 the captain was heard over the CVR to say he was sleepy.

The CERAP controller had indicated earlier that the automatic terminal information system (ATIS) was current. Subsequently, the first officer acquired the weather information from ATIS and was heard over the CVR stating that the conditions at Guam were not good. The first officer then contacted the CERAP controller and requested a deviation left of course around weather. The CERAP controller approved the deviation.

At 0139 the CERAP controller issued a radar vector to join the localizer for Flight 801. The first officer acknowledged the clearance from the CERAP at which point the controller then cleared Flight 801 for an ILS Runway 6 Left approach and stated that the glideslope for the ILS was out of service and not available. None of the crew was heard over the CVR acknowledging the operational status of the ILS glideslope.

At 0140 the flight engineer was overheard asking if the ILS glideslope was operable and the captain replied that it was. Subsequent conversation in the cockpit indicated some confusion with the crew as to the status of the ILS glideslope but no calls to the CERAP were made to confirm its status. At this point the aircraft was approximately nine miles from the runway and descending through 2,600 feet. Thirty seconds later the captain was overheard stating that since the ILS glideslope was not

working they needed to restrict their descent to 1,440 feet and asked the first officer to input the new altitude into the altitude alert system. At this point Flight 801 was already at 1,400 feet and eight miles from the end of the runway. The 1,440 feet reference made by the captain was the minimum descent altitude on the ILS Rwy 6L approach 3.3 miles out from the runway.

At 0140 the CERAP controller instructed Flight 801 to contact the Guam tower. Upon contacting the tower the controller cleared Flight 801 to land and the first officer acknowledged. No further contact with Flight 801 occurred. Flight 801 continued its descent and cockpit activity appeared to reflect the expectations of a normal approach. At approximately 0142, Flight 801 impacted hilly terrain 3.3 miles from the airport. Out of 254 people on Flight 801 only 23 passengers and 3 flight attendants survived.

Air Traffic Control Discrepancies – The FAA has developed and implemented a software program for its Automated Terminal Radar Systems (ARTS) equipped facilities that utilizes a digital map of the terrain that surrounds the airport. This automated feature is called the Minimum Safe Altitude Warning (MSAW) program. Basically, MSAW plots the computed coordinates of aircraft operating in the terminal airspace and alerts the controller when a flight is either projected to enter protected airspace in the immediate vicinity of terrain or determines that a collision with terrain is imminent. An early problem with MSAW was its propensity to create false alerts for controllers. Essentially, this means the system would produce a visual alert to a controller indicating a specific flight or aircraft was in danger of impacting terrain when in actuality it was not. If this occurred frequently it would cause the controller continually and unnecessarily readjust

control priorities over an erroneous control situation. The long-term effect would be to essentially de-sensitize the controller to a critical alert feature of the computer system.

As a result of these false alerts and the low level of air traffic activity at the Guam facility the FAA decided to not give a higher priority to resolving the situation.

Consequently, the MSAW capability of the ARTS system at Guam had been disabled and was not available for operational use.

NTSB Findings – The following is a summary of the relevant findings of the NTSB:

1. The actual weather conditions encountered after the approach sequence was initiated were different than expected. The captain had anticipated visual conditions and never adjusted to the more current information.
2. A video taped airport familiarization briefing produced by Korean Air for its flight crews did not discuss the terrain hazards that could be expected in other than visual approach sequences.
3. Flight 801's crew did not place an appropriate priority resolving the confusion over the operational status of the ILS glideslope.
4. An incomplete instrument crosscheck after the approach descent began did not uncover the altitude discrepancy considering an inoperable ILS glideslope and the inappropriate expectation of a visual approach on the part of the captain. The NTSB also noted that the first officer and flight engineer did not challenge the captain over confusion and erroneous information.

5. The captain admitted he was fatigued which implied the potential for degraded performance.
6. The NTSB considered the CERAP controller's performance to be contributory for the following reasons:
  - a. A position report was not provided to Flight 801 prior to transferring control of the flight to the airport tower controller.
  - b. An observation of a rain shower by the controller was not relayed to either Flight 801 or the tower controller.
  - c. The final approach to the runway after transferring control to the tower controller was not monitored.
7. The NTSB determined that if the MSAW feature of the CERAP's ARTS system had been operational it would have alerted the controller to the hazardous flight condition of Flight 801 64 seconds prior to impact with the terrain. (National Transportation Safety Board, 1996B)

NTSB Probable Cause –

The National Transportation Safety Board determines that the probable cause of this accident was the captain's failure to adequately brief and execute the non-precision approach and the first officer's and flight engineer's failure to effectively monitor and cross-check the captain's execution of the approach. Contributing to these failures were the captain's fatigue and Korean Air's inadequate flight crew training.

Contributing to the accident was the Federal Aviation Administration's intentional inhibition of the minimum safe altitude warning system at Guam and the agency's failure to adequately manage the system. (National Transportation Safety Board, 1996, p. 175)

Latent Issues – The major latent issues that can be identified in the investigation of this accident are as follows:

1. The captain's presumption that visual conditions existed at the airport and subsequent filtering of information to the contrary.
2. The inadvertent decision by Korean Air to omit critical terrain information in their video taped familiarization program for flight crews operating at Guam.
3. The inattention to detail in the cockpit with regard to instrument cross-checks, confusing information, and reluctance to challenge the captain over non-standard procedure.
4. The captain's decision to fly with the knowledge of his fatigue.
5. The CERAP controller's decision to not conduct operations by established procedure.
6. The FAA's decision to place a low priority on the resolution of the MSAW false alert situation at Guam CERAP. (National Transportation Safety Board, 1996B)

### Ethics in the Aerospace Industry

#### Boeing

Boeing is one of the largest, most successful and best known companies with the international aviation industry. Its product line includes commercial, business and military aircraft, space systems, electronics and information systems, weapon systems,

and rotorcraft. They have developed, and subsequently promote, a robust business ethics program that encompasses its entire business spectrum. The *Values* they have established as a core to their ethics program are listed in Table XIII. These values reflect the company's interest in their international leadership position, the quality of their product,

TABLE XIII  
BOEING AIRCRAFT CORPORATE VALUES

Value	Descriptor
Leadership	We will be a world-class leader in every aspect of our business and in developing our team leadership skills at every level; in our management performance; in the way we design, build and support our products; and in our financial results.
Integrity	We will always take the high road by practicing the highest ethical standards, and by honoring our commitments. We will take personal responsibility for our actions, and treat everyone fairly and with trust and respect.
Quality	We will strive for continuous quality improvement in all that we do, so that we will rank among the world's premier industrial firms in customer, employee and community satisfaction.
Customer Satisfaction	Satisfied customers are essential to our success. We will achieve total customer satisfaction by understanding what the customer wants and delivering it flawlessly.
People Working Together	We recognize our strength and our competitive advantage is – and always will be – people. We will continually learn, and share ideas and knowledge. We will encourage cooperative efforts at every level and across all activities in our company.
A diverse and Involved Team	We value the skill, strengths, and perspectives of our diverse team. We will foster a participatory workplace that enables people to get involved in making decisions about their work that advance our common business objectives.
Good Corporate Citizenship	We will provide a safe workplace and protect the environment. We will promote the health and well-being of Boeing people and their families. We will work with our communities by volunteering and financially supporting education and other worthy causes.
Enhancing Shareholder Value	Our business must produce a profit, and we must generate superior returns on the assets entrusted to us by our shareholders. We will ensure our success by satisfying our customers and increasing shareholder value.

Note: Source – <http://www.boeing.com/companyoffices/aboutus/ethics/integst.htm>.

and their support for the interest of Boeing employees, customer satisfaction, and community involvement. They also established *their commitment* as a value enhancing their shareholders' interest in the company. Although one could say it is implied in the content of their value statement, product *safety* and *aviation safety* were not mentioned (Boeing, 2000).

### Raytheon

Raytheon has a 75-year history of being one of the United States' top technology-based companies. Its original focus was the research, development, and production of vacuum tube technology for use in radio equipment. During World War II the company had a significant involvement in the development of radar technology and pioneered the use of microwave technology for commercial uses such as microwave ovens. It also developed the first prototypes of guided missiles and has since become a leader in the aerospace defense industry. Raytheon's own statistics reflected a large multifaceted company that has expanded well beyond its early boundaries. The company has dedicated a portion of its commercial Internet site to ethics. It specifically addressed ethics from the perspective of business practices. *Safety* was not mentioned anywhere in the text associated with this site (Raytheon Ethics, 2000).

### NASA/JPL – A Contrast

The Jet Propulsion Laboratory in Pasadena, California has been considered to be the preeminent site in the world for robotic exploration of the solar system. The laboratory was managed for NASA by the California Institute for Technology. Its

primary mission has been to manage a network of deep space communication sites and a growing series of planetary probes launched by NASA. It was also one of the few aerospace sites on the Internet that fostered a philosophy of ethics. However, a review of that site indicated that its primary *ethics* focus was on contracts, conflict of interest in dealing with government contractors, and maintaining a supportive environment for its employees. The only mention of the word “safety” at this site was with regard to confidentiality issues associated with employees discussing issues with the Ethics Officer. It must be noted however, that NASA-JPL was considered to be principally a scientific organization that gathers, studies, and reports on scientific information as accumulated from space probes (The Jet Propulsion Laboratory Ethics Program, 2000).

#### NASA and Ethics – Post Challenger

In competition for a grant from NASA, Bruce and Russel (1997), of the University of Nebraska at Omaha developed a proposal to construct an ethical profile of the space agency. It had been eleven years since the Challenger disaster, which had generated considerable interest in the ethical processes that the agency applied to its decision-making. This paper sought to answer the following questions:

1. What is NASA now doing regarding ethics?
2. What training is being provided? By whom? For whom?
3. Are the answers to these questions different at different NASA installations?

To answer the first question the researchers conducted a thorough search of electronic and bound databases. The electronic search included the Public Affairs

Information Service (PAIS), First Search, Uncover, and InfoTrac General Periodical Index. Archives of several major national newspapers were searched including relevant United States Government Documents. The search utilized a finite series of key words, which included: NASA and ethics, government and ethics, NASA and morals. This search returned a total 6 articles from just five sources. The keywords 'government and ethics' were submitted to the same five sources and returned over 2000 articles. This would suggest that there is a significantly small amount of literature available that deals with NASA and ethics together. Faced with these minimal results the researchers broadened their use of associated key words, which essentially produced the same general results. The results of this last search seemed to indicate most of the literature that even remotely implied an association with ethics tended to address issues of finance, policy, planning, and management.

Their search of the scholarly indexes only identified three volumes that dealt with ethical questions in NASA (Hoban, 1989, 1993; Vaughan, 1996). Consequently, the researchers determined that most of what had been written about NASA since the Challenger incident would be found in the popular press, trade journals, and newspapers.

The next part of their study involved a search of fifteen web sites related to specific NASA organizations. These sites were reviewed for organizational charts that:

1. Reflected a responsibility for or role in ethics.
2. Employees with a title that implied ethics.
3. Mission, vision, and value statements with an ethical context. (Bruce & Russel, 1997)

This search returned only three positions out of fifteen sites that had ethics in their title: (1) Associate General Counsel & NASA Ethics Official at NASA Headquarters, (2) Human Resources – Ethics Director at Ames Research Center, and (3) Manager of business Ethics at the Jet Propulsion Lab. Only one ethics related course was found but it was focused on contract management and was meant for individuals interested in career progression.

After reviewing the organizational structure at the selected NASA sites the researchers personally contacted managers within each organization to inquire what was NASA actually doing in the area of ethics. All of the sites except one indicated that the primary focus on ethics within NASA was associated with the recognized Standards for Ethical Conduct for Employees of the Executive Branch that is mandated for all governmental organizations. The exception was the Jet Propulsion Lab (JPL) in California. The individual contacted at the JPL indicated that their organization was not technically a NASA center. It was a research and development center funded by NASA but operated by Caltech. He offered that JPL did have a growing ethics program which included both training and employee networks designed for sharing of information and experiences. Owing to this difference he indicated that he was not aware of any ethics network in NASA and felt that JPL's ethics programs were not necessarily associated with the agency.

The literature review of the published material revealed that most of the information available was written on the Challenger disaster from some perspective, and most of this material was found in the popular publications as opposed to scholarly material. It was apparent to the researchers that most of the material devoted to NASA

was not focused on ethics or decision-making processes but to the issues of costs, program management, and public affairs. In fact, in one reference to an editorial in Aviation Week and Space Technology, NASA was accused of being too interested in chasing the high profile projects for leverage with the public than they were in space science.

Regarding what NASA is currently doing about ethics; the researchers felt that there was little concern within the agency over values and morals when it came to decision-making. They felt that the sole focus within the agency was on the federally mandated ethics code that was imposed on virtually all governmental organizations. This constitutes a series of employee guidelines focused on outside employment activities, financial conflict-of-interest, post-Government employment activities, financial interest reports, etc.

Regarding the question of what ethics training was being provided to NASA employees; with one exception, the only training around ethical issues within the agency had been focused on the 'conflict-of-interest' statutes and the assurance that all NASA employees in relevant positions have met the mandated requirements. This approach to ethics was considered to be a normative system establishing laws, rules and regulations that are designed to discourage inappropriate business practices. Other studies have suggested alternative priorities for organizations that tend to place their *ethics* focus on business practices. Organizations should be more aggressive in building environments that encourage their people "...to do what is right for themselves, their company and their community rather than what they think is expected of them" (Bartlett & Preston, 2000, p. 208).

One obvious exception to the practice and training of business ethics within NASA was the Jet Propulsion Laboratory (JPL) in California, as mentioned earlier in this study. The JPL had initiated an ethics program that deals with the concepts of moral judgments in a technical environment. Not only had the JPL developed courses in ethics but they had been expanded to roundtable discussions and networks for sharing perspectives on ethics. Certainly this was unprecedented within the agency, if not the industry.

Regarding the question as to whether these questions produced different answers at the various NASA centers; the researchers determined that, with the exception of JPL, there was little emphasis placed on ethics within NASA. Werhane (1998) discussed similar findings in a study that reviewed ethical practices within a variety of American companies including those who conduct business with the Federal government (Werhane, 1998).

In contrast to Werhane's findings, a further review by this researcher of Internet web sites, company produced marketing material, and brochures indicated that although ethics were often addressed, it was always in the context of business practices and organizational objectives. No indication was found that discussed ethics as it related to flight safety, associated decision-making practices, or commitments to public safety. This in no way implied the companies are not concerned about or focused on flight safety. It does suggest, however, that industry does not see that value as one to project into the public domain. As an example, Bombardier Corporation is a large and diverse aerospace company that is noted for the production of high quality business jets, including the Learjet. However, the brochures produced to promote their business ethics policies

within their companies do not mention product safety or flight safety (Bombardier, 1992 & 1994). The reader must assume it is implied in the business of aviation.

In conclusion, the researchers felt that a change of focus on ethics was needed in NASA. Given the profound nature of their mission, the significant investment of tax dollars, and the cultural implications to the society at large it is necessary that NASA rethink their position of ethics within the ranks of its employees. "NASA needs responsive and responsible decision-makers who are able to define the ethical dimensions of a problems and to identify and respond to an ethic of public service as well as one of risk management" (Bruce & Russel, 1997).

## The Teaching of Ethics

### Knowledge of Ethics and Behavior

The question as to whether knowledge of ethics and moral constructs has affected behavior has long been a topic of debate among philosophers, academics, and psychologists. In many areas of study it is felt that there are weak links, if any at all, between knowledge of moral behavior and actual behavior. The argument proposed is the presence of free will in a person. An individual can know the "right" thing to do, but may choose to do something different as a result of rationalization or other justifying factors. The ancient philosophers disagreed on some aspects of knowledge affecting behavior, however, they generally agreed on the fact that individuals who were more knowledgeable of ethics and moral constructs seemed to display a more virtuous behavior. Socrates claimed that all that was necessary for one to live the virtuous and

good life was to have the right knowledge. He held that one's behavior was a clear indicator of the level of knowledge one had regarding morality. Plato believed that a person's behavior was an indicator of an inherent knowledge of virtue. But, he also felt that for one to possess knowledge of virtue, they must have had been exposed to appropriate behavior earlier in their life. He also felt that for education in morality to have any effect on the person at all, the behavioral modeling should come first (Irwin, 1995). Rest (1979), in Development in Judging Moral Issues, uses the Bible as a reference in establishing the point that the teaching, or knowledge, of ethics does not necessarily affect ethical behavior. The Apostle Paul, in his letter to the Romans, Chapter 7, verse 19 (NIV) states: "For what I do is not the good I want to do; it is no longer I who do it, but it is sin living in me that does it." (Rest, 1979)

Contemporary writers and researchers have essentially noted the same phenomenon. Aronfreed (1978), a noted psychologist who has conducted considerable research into the development of the child felt that behavior was at least partially controlled by conditioning that appears to be separate from rational thought (Aronfreed, 1968). Kohlberg's work inferred that moral (ethical) education occurred in a measurable way in the classroom at two different levels. One was behavior modeling on the part of the teacher or individual who served in a position of authority in an educational situation. The other was research that indicated progressive education in individuals produced higher levels of ethical discernment (Munsey, 1980).

To counterbalance the position that knowledge may not necessarily be a valid predictor of behavior, Rest offered correlational research that indicated a clear association with the numbers of years of formal education and progressive abilities to effectively deal

with complex moral dilemmas. This research was predominately gathered with the Defining Issues Test instrument given students destined to enter college and students in progressive levels of college. His position was that individuals' concepts of fairness and social moral-constructs increased proportionally with their level of formal education. And while it cannot be shown that it is a direct predictor of behavior, the exposure to higher levels of education provided individuals' with different models and methods of processing that can have an affect on how they approach decision-making (Rest, 1979; Harris & Sutton, 1995).

### Principle-Centered Leadership

Within the corporate community there were a variety of third-party vendor offered seminars designed to assist organizations work with their employees with respect to building a variety of organizational skills. One of the more popular seminars, and one which has gained considerable public attention in the self-help area as well, has been Covey's Principle-Centered Leadership. This effort by Covey was a follow-on to his extremely popular seminars and book on The 7 Habits of Highly Successful People. While Covey did not specifically treat the issue of ethics as a singular topic, he included it in the initial identification of the eight characteristics of Principle-Centered Leaders. The eight characteristics are offered as follows:

1. Leaders are continually learning. Covey described this as a self-initiated effort to continue expanding one's knowledge base. It is characterized as essential for one to achieve self-mastery.

2. They are service oriented. Service orientation is described as the drive a leader has to have responsibility, service to others, and stewardship visibly manifest in their lives.
3. They radiate positive energy. Covey discussed the importance of leaders having a high energy level and discusses the positive effect it can have on others. He emphasized this as a critical component in a leader's ability to effectively deal with and deflect negative energy.
4. They believe in other people. Believing in others, particularly those for whom a leader may be responsible, is a well-recognized ethical characteristic that has been mentioned by numerous authors. It is considered to be an intrinsic part of the utilitarianism philosophy that considers the ultimate effect, good and bad, on people. This characteristic was also discussed in Brown (1996).
5. They lead balanced lives. Covey described these individuals as developing and maintaining an eclectic life-style that includes exposure to a variety of personally expanded environments. This included being well-read, developing an appreciation for the arts and sciences, and having a healthy sense of humor.
6. They see life as an adventure. These leaders are continually challenged by life and all of its intricacies.
7. They are synergistic. These individuals have a strong drive to work to improve all that they are associated with. They are always open to new and different ways to achieve continual improvement.

8. The exercise for self-renewal. Finally, Covey stated that principle-centered leaders recognize the four dimensions of the human spirit: (1) physical, (2) mental, (3) emotional, and (4) spiritual. These individuals exercise all of these areas with the desire to keep them fluid, challenged, and manifest in their lives (Covey, 1992).

While all of these characteristics arguably include certain ethical components, the characteristic that addresses the tendency of leaders to lead balanced lives is the most direct reference to ethical, or Postconventional, thought. Covey stated in the description of that characteristic that these individuals have an inherent regard for honesty, about themselves and with others (Covey, 1992).

#### Texas A&M School of Engineering

The Engineering College at Texas A&M University has offered a course titled Engineering Ethics for many years. The school has always had a strong affinity for applied ethics in the field of engineering. In 1990 they were asked by the National Science Foundation (NSF) to study the feasibility for integrating the study of ethics into an engineering curriculum. There had been several events over the past two decades that indicated a need for ethics to become more of a discipline in the field: (1) the Kansas City Hyatt-Regency Hotel walkway collapse, (2) the Space Shuttle Challenger accident, and (3) the Exxon Valdez oil spill in Alaska. However, they were faced with the reality that typical engineering and science teachers were not equipped with background, experience or education sufficient to address ethics in the classroom. Consequently, the school identified a small number of courses and professors and began to integrate elements of

professional ethics into their courses. The response was very good and the interest began to spread among both professors and students. As the interest grew and the faculty became more comfortable with the subject, the material was organized into a course and offered as an elective. In 1997 the school changed the course from the being an elective to the status of prerequisite requirement for graduation.

As a result of the NSF Project and a desire to expand the discipline throughout the field of engineering, Texas A&M has developed a syllabus, case studies, instructor's guides, student handouts other associated classroom material and makes it available to other educational institutions. The major topics that have been covered are:

1. Moral Concepts and Theories
2. Basic Concepts and Methods in Ethics
3. Ethics and Professionalism in Engineering
4. Organizational Loyalty and Professional Rights
5. Engineers and the Environment
6. Risk and the Engineering Decision-Making Process
7. Negligence and the Professional "Debate" over Responsibility for Design
8. Literature on Whistleblowing – An Overview
9. Engineering Design: Literature on Social Responsibility Versus Legal Liability. (Harris, et al., 2000)

Considerable interest in the Texas A&M NSF Project has grown throughout the country with regard to the subject of engineering ethics and there are indications that it is quickly becoming a discipline unto itself. It has been seen as a discipline very similar to Medical ethics, business ethics, and legal ethics (Harris, et al., 2000).

The Engineering Ethics course syllabus as taught by Texas A&M has been designed to introduce the student to progressively complex issues relating to problem and dilemma resolution. This was accomplished by dividing the course into three basic areas of study:

1. Critical Approaches – In this initial area of study the student is exposed to the fundamentals of applied ethics. Issues around morality and professionalism are discussed in general terms and engineering ethics as a concept is presented as ‘preventative ethics’ to emphasize to the student their role in protecting the public welfare. This is an essential element in developing a set of professional ethics. The student is also exposed to various models of problem research to assist in developing a full and complete understanding of the issues before problem solving can take place. The student is then exposed to various method of moral problem solving. This first area of study is not focused on the engineering profession as much as just the general precepts of moral reasoning and problem-solving.
2. Individual Responsibilities and Generic Concerns – This area of study provides deeper exposure to issues of cultural morality as they pertain to public and professional responsibility. The course material begins to reflect more of the engineering discipline in this area and presents issues of integrity, elements of responsibility, and risk management from that perspective. Minimalist and utilitarian concepts are also presented to the student during this phase of study.

3. Special Areas of Interest – This last section of study deals exclusively with the various engineering professions. The codes of conduct of various professional disciplines are presented and contrasted with each other. Environmental ethics are also introduced in this section, which further emphasizes the responsibility of the engineer for the public welfare.  
(Harris, et al., 2000)

The course objectives for the Texas A&M ethics course material were designed to take the student from a zero-base knowledge in the discipline of ethics and moral constructs and progressively build skills in the student to the point where they can deal with extraordinarily complex dilemmas that can be experienced in the technical environment of engineering. The five basic course objectives are:

1. Stimulate the students' imagination regarding moral issues. Often, professionals are confronted with issues that require innovation and creativity. During these creative processes it is essential that existing ethical issues are address and awareness is maintained regarding potentially new ethical issues. Creativity in developing solutions demands an active imagination regarding potential consequences.
2. Teach the student to recognize ethical/moral issues. The obvious ethical issues presented by most technical initiatives do not require great skill in identification. However, as addressed by Reason's Model and discussed throughout this paper the more subtle, or latent issues, that have moral or ethical concerns often do require great skill to identify.

3. Develop good analytical abilities. Professionals generally possess good analytical abilities. However, more times than not these skills are associated with empirical, or numerical data. Ethical issues are often more intrinsic and require stronger skills of insight and abstract thought.
4. Create a sense of responsibility in the student. Texas A&M defines engineering ethics for its students as preventative ethics. The change in terms is designed to focus the student on their responsibility for protecting the greater good of the public and resolving issues at their origin. This approach should minimize the development of latent issues and the long-term problems associated with them. It forces the student to think beyond the temporal decision environment and consider potential outcomes before they manifest.
5. Teach the student to tolerate disagreement and ambiguity. It is not unusual in professional environments to be confronted with confusion, disagreement, and ambiguity among peers when considering technical issues, concepts and proposals. For professionals to assure confidence and validity in their actions they need to develop an effective capability to deal with these issues.

A principal method of course presentation used by Texas A&M in delivery of Engineering Ethics was a significant dependency on case studies. The textbook provided 57 cases studies that the professor can use in the explanation of various ethical precepts. Case files also provided a productive learning opportunity for students in experiencing applied ethics in the engineering career field (Harris, et al., 2000).

## Summary

From Socrates to Dewey, Piaget, Kohlberg, Rest, and others, man has been interested in understanding what is meant by the *virtuous* or *good life*. The questions raised by Hume regarding *what is* and *what ought to be* are at the core of man's desire to improve his world and environment. Most of the great thinkers and philosophers consider ethics to be the central to man's existence and critical to society's welfare. When Aristotle defined politics, nearly 2,400 years ago, as the *study of good*, the notion that civic responsibility and social welfare on the part of political leaders was embraced as the highest moral value to be attained.

How such notions of morality and moral constructs dictate and influence behavior have become a scientific discipline unto itself. In today's world civic responsibility and social welfare are not the sole responsibilities of political leaders. Society today is large, complex, and diverse. The globalization of the world economy only compounds that complexity. Governments, corporations, and public institutions such as banks, universities, and foundations all share in the political responsibilities Aristotle spoke of. The science of *applied ethics* deals with the application of the philosophy of ethics in professional disciplines, corporations, and other organizational entities that provide product, services, and support for society. The issue of decision-making ethics within this infrastructure of organizations, and specifically within the aviation and aerospace industry, was the subject of this study.

Reason's Model was used throughout this study as the principal model for exploring the affects of decision-making ethics within the aviation and aerospace

industry. The concept of decision-making ethics is best understood by association with the phenomenon of latent issues as defined and described by Reason's Model. Latent issues are those long-term affects of decisions that are not generally associated with the intent, or focus, of the original decision. The Presidential Commission on the Space Shuttle Challenger accident was used to illustrate the criticality of decision-making ethics and the disastrous effects of latent issues. Problems, concerns, and doubt about the functionality of the O-ring construct in the SRBs for the space shuttle launch system were issues at least 7 years before the accident actually occurred. A process within NASA did not exist that would have called for a critical review by appropriate decision-makers of the problem in light of its potential failure and subsequent impact on shuttle missions. An independent study of ethics in NASA 10 years after the Challenger accident did not find an appreciable difference in sensitivity to decision-making ethics. Other accidents within in the aviation industry, as investigated by the NTSB, were also discussed in this study with similar results. Latent issues from decisions have disastrous results.

Inquiries within various organizations in the aviation and aerospace industry with regard to their professed public positions on ethics produced curious results. While many of these organizations have detailed brochures, Internet web sites, and public statements that profess an ethical standard, none specifically address product safety or flight safety. Invariably, their positions around ethics talk in general terms about conflict-of-interest issues, contract integrity issues, and business ethics. There were no organizations that discuss their position on social responsibility with regard to product or flight safety.

Ethics and decision-making ethics was taught as required course within the educational institutions that support the legal, medical and engineering professions. These professions also have developed, honor, and enforce as stringent code-of-ethics that dictate their responsibility to the public as well as their behavior as a recognized professional. The aviation and aerospace industry does not have an identifiable code-of-ethics, nor it is emphasized within any aviation or aerospace educational curriculum as a required course of study. Ample evidence existed within the educational discipline that ethics and moral constructs that are helpful in developing ethics-based decision processes can be taught. However, there is little evidence that directly associates the teaching of ethics with ethical behavior. What does appear to be most important is that exposure to ethical concepts in increasingly complex educational environments does, in fact, provide more complete mental models for individuals to rely upon during decision-making opportunities. These stages of moral development have been defined by Kohlberg and validated through numerous longitudinal studies. Subsequently, Rest developed the Defining Issues Test that detects and categorizes an individual's moral development along Kohlberg's stages. The result is a metric that can be used to determine an individual's, or groups', development along the prescribed moral development scale. Informed deliberations can then be made about their potential for ethical decision-making.

## CHAPTER III

### METHOD

#### Overview

This chapter provides the reader with a systematic description of those procedures used by this author during the conduct of this study. To facilitate the description this chapter has been arranged to cover the following topical areas: Plan of Study, Sample, Instrument, Data Collection, and Analysis.

#### Plan of Study

##### Research Considerations

Decision-making has been identified by numerous researchers as having measurable components with regard to individual, organizational and environmental ethical and moral constructs (Frey, 2000; Schnebel, 2000). If a valid and reliable method of quantifying the moral reasoning of a group could be determined then one could speculate with some accuracy about the decision-making ethics potential within that group. One of the purposes of this study was to examine the ethical standards of the aviation and aerospace industry as it related to the decision-making criteria of mid-level executives and above. The research problem for this study was to quantify the

ethical/moral constructs of key management and operational personnel within the industry.

Type of Study – This was a *descriptive study* utilizing *self-reporting research*.

Data were collected from a group of subjects that represented a *cross-sectional* perspective of the aviation and aerospace industry. The objective of the study was to describe the moral constructs of principal decision-makers within the industry utilizing an accepted, valid and reliable survey instrument. The results allowed for the comparative analysis of those decision-makers with the performance of similar populations within other industries and professional disciplines. The format of the study was carefully modeled after the methodology for conducting survey based research as described in Wiersma (1995) and reflected in Table XIV.

TABLE XIV

GUIDELINES FOR CONDUCTING SURVEY RESEARCH

Step	Activity
<u>Planning</u>	
	<ul style="list-style-type: none"> <li>• Define research problem</li> <li>• Define variables</li> <li>• Review literature</li> <li>• Develop survey design</li> </ul>
<u>Development and Application of Sampling Plan</u>	
	<ul style="list-style-type: none"> <li>• Define population</li> <li>• Identify sub-populations</li> <li>• Detail sampling procedures</li> </ul>
<u>Selection of Instrument</u>	
	<ul style="list-style-type: none"> <li>• Consider alternative instrumentation</li> <li>• Develop draft analysis procedures</li> <li>• Pilot test</li> <li>• Revision of instrument (if necessary)</li> <li>• Identify proxy agents</li> </ul>

TABLE XIV – Continued

Step	Activity
<u>Data Collection</u>	
	<ul style="list-style-type: none"> <li>• Administer questionnaire/survey</li> <li>• Follow-up (as necessary)</li> </ul>
<u>Translation of Data</u>	
	<ul style="list-style-type: none"> <li>• Technical preparation for analysis</li> </ul>
<u>Analysis</u>	
	<ul style="list-style-type: none"> <li>• Separate analyses of subgroups</li> <li>• Execute correlation study</li> <li>• Synthesis</li> </ul>
<u>Conclusions and Reporting</u>	
	<ul style="list-style-type: none"> <li>• Summarize</li> <li>• Suggest further research</li> </ul>

Note: Source – Wiersma, 1969/1995.

Purpose Restatement – The purpose of this study was to examine ethical standards as they related to decision-making criteria of mid-level, and above, executives within selected major aviation and aerospace organizations in the United States.

Hypothesis Restatement – Differences in the development of moral reasoning of aerospace industry executives, managers, and supervisors as measured by a test to determine one's moral reasoning ability, will produce results that are higher than comparable studies of other industries and disciplines.

Assumptions – The dependent variable was the only variable appropriate in this study. The dependent variable basically represented the scores generated on the survey instrument and provided as a single quantifiable number for purposes of comparison with independent studies of other groups measuring similar constructs. Because this was a

descriptive study designed to describe the decision-making environment within an industry, there was no requirement to develop or manipulate independent variables.

Limitations – There are several institutional limitations to a self-reporting study of this type and one industry-oriented limitation that was applicable to this study. The institutional limitations are associated with many factors:

1. Mailed survey – Surveys distributed through the mail system were dependent upon many factors that the researcher had limited control over. While the mail system was fairly dependable, there was no reliable way to determine the timeliness of delivery of the initial questionnaire packet or the return of the completed forms. It also limited the certainty that the person responding actually met the population criteria. This induced an unknown in terms of determining the actual completion of the data gathering activity and probably responsible for the low return rate with some of the subgroups (Isaac & Michael, 1995).
2. Self-reporting – This type of questionnaire assumed the respondent to fully understood the instructions and process of the DIT2 instrument. Although the DIT2 had considerable reliability and validity, and has been used for several years, no opportunity was provided for questions or problems that could have been encountered by the respondent (Isaac & Michael, 1995).
3. Follow-up to non-responses – The follow-up to non-responses was limited to frequent conversations and telephone calls to each of the proxy agents regarding the status of returned completed forms from the sub-group

(industry segment) they were responsible for. Many of these follow-up initiatives resulted in additional forms being returned within days of the conversations.

4. Commitment of respondent – Since proxy agents were used in the distribution of the DIT2 questionnaire the principal researcher was unable to judge the commitment on the part of the individual respondents with regard to their participation. For this reason, the principal researcher carefully solicited and selected the proxy agents with emphasis on their personal reliability, credibility, organization position and responsibility.

The industry-oriented limitation considered as being unique in this study was the issue of *safety*. As discussed in Chapter II of this study, *safety* was seen as more of an implied value than one publicly touted or emphasized. This study was about the ethics of decision-making within the aviation and aerospace industry with questions around the latent effects of those decisions on such issues as safety. The principal researcher participated in many conversations on the subject with representatives throughout the industry that were characteristically supportive and interested in the issues. Some of the organizations that were contacted included, but were not limited to: (1) Air Transport Association (ATA), (2) Aviation Week and Space Technology (AW&ST), (3) National Defense Industrial Association (NDIA), and (4) Defense Industry Initiative (DII). However, when asked to consider participating in the study by consenting to answer the DIT2 questionnaire, or distribute it within their organization, many declined. This makes

the issues somewhat more difficult to address in an environment where openness and full disclosure was not considered a safe activity from a business perspective.

Institutional Review Board (IRB) – The purpose of this study was to examine ethical standards as they related to decision-making criteria of mid-level, and above managers within the aviation and aerospace industry. Consequently, the research involved human subjects by way of the administration of a standardized test. The research protocol for this study was submitted to the Institutional Review Board pursuant to Federal policy and University guidelines prior to initiation. Subsequently, the IRB approved the protocol with an expiration date of June 16, 2001 (Appendix A).

## Population

### Characteristics of Population

The target population for this research study consisted of supervisors, managers, and executive-level management individuals within the various aviation and aerospace organizations. It also included flight crewmembers that occupy command status on both commercial and military aircraft. The fundamental criteria for this population was that these target individuals would possess a certain degree of autonomy with regard to their decision-making environment and were specifically responsible for decisions that had significant impact on organizational missions, products, services, and people.

While the principal objective of the study was to describe the overall decision-making ethical construct for the industry-at-large, the population discussed above was divided into four sub-groups that represented distinct divisions of roles and

responsibilities. This provided the extra opportunity to look at differences that may occur within the industry between modal organizations. The sub-groups are listed and defined in Table XV.

TABLE XV  
POPULATION DEFINITION FOR STUDY

Sub-group
<u>Support</u> – FAA Mike Monroney Aeronautical Center <ul style="list-style-type: none"> <li>• Provide logistical support, training, and maintenance.</li> </ul>
<u>Regulatory</u> – FAA Headquarters & NTSB <ul style="list-style-type: none"> <li>• Provides regulatory functions and compliance oversight for U.S. aviation and aerospace industry.</li> </ul>
<u>Manufacturing</u> – Corporations/businesses <ul style="list-style-type: none"> <li>• Organizational entities within the industry that provides products.</li> </ul>
<u>Operations</u> – Airlines/Military/NASA <ul style="list-style-type: none"> <li>• Those elements within the industry that represent the point-of-service activities.</li> </ul>

The *Support Sub-group* consisted of target managers and supervisors that worked within the various organizations and tenant structures that are hosted by the Mike Monroney Aeronautical Center. This Center is a major organizational complex within the FAA with nearly 5,000 employees. It is the largest concentration of Department of Transportation (DOT) employees outside of the Washington, D.C. area and it provides logistical support for all of the FAA and a significant portion of the DOT. As a macro-organization it represents all of the modal organizations that function within the FAA.

Those employees represent a homogeneous population of the larger FAA field population.

The *Regulatory Sub-group* consisted of target personnel that work in either of two areas: (1) FAA Headquarters and (2) NTSB. The FAA Headquarters personnel were selected from the Administrator's staff and the NTSB personnel were selected from the Chairman's staff.

The *Manufacturing Sub-group* was basically represented by two corporations whose primary business was the production of regional and executive jet aircraft.

The *Operations Sub-group* directly included two of the primary target organizations and one by default. Target personnel in the NASA/JPL in Pasadena, California participated. Also directly involved were pilots-in-command for the 552<sup>nd</sup> Air Control Wing (ACW) assigned to Tinker Air Force Base in Oklahoma City, Oklahoma. Many of the pilots for the 552<sup>nd</sup> ACW are Reserve Air Force Officers and fly for many of the airlines in a civilian capacity. Therefore, the airlines are considered to be included in the collected data sample by default, although the actual number is unknown.

## Sample

### Sampling Technique

The sampling technique applied for this study was considered to be a combination of *purposive/cluster* methodologies. The researcher divided the larger population defined

by the aviation and aerospace industry into four separate sub-groups as defined above. This *purposive* designation was based upon expert knowledge of the nature of the industry and reasonable delineations of roles within the industry.

### Sample Size

Although this was basically a descriptive study of the ethical constructs of decision-making within the aviation and aerospace industry, data were obtained from subjects for the purpose of comparison with similar studies of groups outside of the industry. Analysis techniques from comparative research were used to compare the survey results from this study with results from studies of other groups using the same instrument. A minimum of 30 subjects is generally required for this type of study (Gay, 1996). The sampling plan for this study called for a maximum of 100 questionnaires to be distributed to organizations within the defined population and its sub-groups. If the participation rate was 33.3 % or greater the minimum number considered valid for this type of study would be achieved.

### Instrument

#### Instrument Selection

In a search for instruments that would assist in the determination of the moral constructs that participate in decision-making activity three were considered for utilization in this study:

1. Hahm Beller Values Choice Inventory (HBVCI) – Designed principally to evaluate the moral constructs of decisions related to sport activities, this instrument has been utilized in a variety of environments. Currently, it has been given to nearly 50,000 individuals most of which have been those individuals engaged in some type of non-professional sports relative activities. The test was designed to measure cognition with respect to knowledge of moral principles. Basically the test consisted of approximately 30 questions designed around, and presented through sports-related dilemmas. The test was designed around deontological concepts concerning honest, responsibility, and justice, all within the context of sports activities (The University of Idaho, 2000).
2. Moral Judgment Interview (MJI) – This interview test format was developed by Kohlberg to identify his theoretical construct of the six stages of moral development. The MJI was an interactive questionnaire (structured interview) that depended upon an interviewer to ask the respondent various questions about moral dilemmas that were designed to reveal the schema used by them to interpret the moral issues in the example. Some of the criticisms of this test centered on the participation of the interviewer in the process. Many felt it introduced variables associated with the interviewer that could possibly have an effect on the responses of the respondent. Another criticism was directed at the narrative scoring of the results by the interviewer. Scholarly review of the

MJI determined that although it had high content reliability it drew criticism over its methodology (Rest, 1979).

3. Defining Issues Test - The DIT test was developed by Rest to address the shortfalls of the MJI test described above. Rest's idea was to develop a method to present and score moral dilemmas consistently and objectively to assess the moral development of an individual with respect to Kohlberg's MJI and the six stages of moral development. The original test contained 6 dilemmas the respondent was asked to rate and rank on a computer scored sheet (Appendix B). The DIT has been used since 1974 and been used in over 400 studies of moral constructs with numerous groups. The test was recently revised which including being shorten from 6 to 5 scenarios and updating the scenarios to reflect more contemporary events (Appendix C) (Rest & Narvaez, 1998B; Rest, Narvaez, & Mitchell, 1999).

The DIT test was chosen for the primary instrument for this study because of its proliferation within a variety of disciplines and ethnographic groups over the last 25 years. Its construction was also considered to have more utility for this study considering the scope and range of the target population. The fact that it could be self-administered and scored via a computer offered considerable advantages in addressing a geographically diverse population as defined in this study.

## DIT Specifications

Background – The Defining Issues Test (DIT) is a variant to Kohlberg’s Moral Judgment Interview (MJI) that was developed as a method to assess an individual’s progress through the six stages of moral development. Moral development and judgments have been shown to be critical elements in applied ethics and decision-making. Kohlberg’s research was determined to be extremely important in the effort to better understand the development of ethical constructs but many felt his assessment instrument, the MJI, was flawed. It depended upon the observer (interviewer) to make critical and subjective assessments of the interviewee’s responses. This injected potential bias into the process and was felt to likely skew the results (Gill & McGee, 2000). Rest, a psychologist and researcher at the University of Minnesota, developed the DIT instrument with the objectives of achieving the same results as Kohlberg but eliminating the bias found in the MJI. The DIT has since been used for over 25 years in over 400 separate studies (Rest, Narvaez, Thoma, & Bebeau, 1999).

Fundamentally, the DIT is a paper and pencil questionnaire that is designed to measure an individual’s moral judgment as derived from Kohlberg’s theory of moral development (Kohlberg, 1986). As discussed above, Kohlberg’s MJI depended upon the free responses from a subject in response to the presentation of a hypothetical dilemma which were then observed, assessed and recorded by a second party. In contrast, the DIT subject is presented with 12 issues, or statements, about a hypothetical dilemma and asked to rate and then rank each in terms of its importance and relevancy to the dilemma.

The respondent then records their responses directly onto a Likert Scale scoring form.

The DIT scoring algorithm then analyzes the responses by categorizing them into one of three schemas:

1. Personal Interest Schema
2. Maintaining Norms Schema
3. Postconventional Schema

Researchers using Kohlberg's MJI ranked their subjects' responses against the six stages of development. The schemas activated by the results of the DIT are similar to Kohlberg's stages in that they measure an individual's ability to conceptualize, develop and/or foster cooperation within social constructs. The operative index produced by the DIT is referred to as a "P Score." Basically, the P Score was derived from the ranking and rating data that were equated to stages one through six as defined by Kohlberg's Moral Development Theory. The scores are then weighted with emphasis on stages five and six, which represent Postconventional reasoning. Therefore, the P Score index is best understood as the extent to which a person prefers Postconventional moral thinking presented as a percentage. "In short, the DIT is a measure of the development of concepts of social justice" (Center for the Study of Ethical Development, 1998, p. 26).

#### Instrument Construct

The DIT2 consisted of the following five constructed dilemmas:

1. A father considers stealing food for his starving family from the warehouse of a wealthy person.

2. A newspaper reporter considers printing a damaging story about a political candidate.
3. A school board considers whether to hold public meetings to address difficult issues for the community.
4. A doctor considers the ethics of providing an overdose of pain-killers to a patient.
5. College students demonstrate against public policy.

Each scenario was accompanied by twelve questions about issues that may (or should) be considered by the agent in the scenario in deciding the appropriate course of action. The respondents were asked to participate in two activities with respect to each scenario. First, they were asked to rate each question in order of importance on a 1-5 Likert Scale. Second, they were then asked to rank, in order of importance, the four most important questions of the 12.

At the conclusion of the rating and ranking activity for the five scenarios, the respondents were then asked to answer six demographic questions.

### Validity and Reliability

As stated earlier in this study, the DIT instrument has been used for approximately 25 years in over 400 research studies and presented in numerous publications. The reliability and validity of the DIT as presented in the Guide for DIT2 is reprinted in Appendix D.

## Data Collection

### Collection Procedure

The DIT2 packets were grouped and bulk-mailed to each of the identified proxy agents and contained the following material:

1. Letter of introduction and explanation (Appendix E).
2. DIT2 Survey Questionnaire (Appendix C).
3. DIT2 Survey Questionnaire instructions (Appendix C).
4. Postage-paid return envelope.

The forms contained no request, or space allocated for the respondent, to place their name or any other identifying information. Neither did the DIT2 packets or the return envelopes contain any information, marks, or identifying features that would indicate in any way who the respondent may have been. However, a coded number was placed on each form designed as a designator to identify the segment of the industry the respondent worked within.

The completed DIT2 forms were then returned to the researcher via the postage-paid envelopes included in the packet. The scoring forms were removed from the return envelopes, then sorted by the appropriate industry sub-group previously defined. When the data collection process was completed, the sorted scoring forms were mailed to the Center for the Study of Ethical Development at the University of Minnesota.

Pilot Test – A pilot test to determine the reliability and validity of the DIT2 test was not considered necessary primarily because of its institutionalization within the ethics

community and its use over the last 25 years in over 400 separate studies. A pilot test to assess the logistics of distribution, self-administration, and returning completed forms was conducted in projecting the instrument into the support sub-group (Mike Monroney Aeronautical Center) (Table XVI). There were numerous divisions within the various organizations within MMAC that were managed by individuals who represent the target population of this study.

TABLE XVI

## DIT 2 POPULATION

Identification Number (ID)	Population Segment & Description
111(dd)	<u>Mike Monroney Aeronautical Center (OKC)</u> <ul style="list-style-type: none"> <li>• Programs directors, Division managers, and Branch managers</li> </ul>
222(dd)	<u>FAA Headquarters (D.C.)</u> <ul style="list-style-type: none"> <li>• Administrator's staff, Deputy and Association Administrators, and Program directors, NTSB Chairman's staff</li> </ul>
333(dd)	<u>Manufacturing</u> <ul style="list-style-type: none"> <li>• CEO Staff and Vice presidents</li> </ul>
444(dd)	<u>Operations</u> <ul style="list-style-type: none"> <li>• Line managers and Flight crew</li> </ul>

Instrument Revision – Any revisions dictated as a result of discovery during the pilot test were accomplished prior to the initiation of the study of the remaining three sub-groups.

Proxy Agents – The principal population for this study (Table XVI) involved supervisors, managers, and executives in a variety of organizations within the aviation

and aerospace industry. Although the DIT2 instrument was designed to be taken without supervision and distributed through the mail it was considered to be more effective if proxy agents could be recruited from the various organizations, briefed on the target criteria for subjects and then have them recruit potential respondents from within their organization (Table XVII). The principal researcher recruited six agents within the aviation and aerospace industry to act as proxies in the selection of potential respondents and were briefed on the procedures for distribution, explanation, and execution of the DIT2 instrument. The agents assessed the sub-group for its potential to produce respondents and informed the principal researcher of the number of packets they needed to distribute within their organization.

TABLE XVII  
AGENTS IN DISTRIBUTION OF DIT 2  
SURVEY PACKETS

Agent (Proxy) by Position	Organization	Sub-group
Principal Researcher	FAA (MMAC)	Service
Associate Administrator	FAA (Headquarters)	Regulatory
Chief of Staff	NTSB	Regulatory
Systems Manager	Boeing	Manufacturing
Chief of Staff	Bombardier	Manufacturing
Ethics Manager	NASA/JPL	Operations
Senior Pilot, Chief of Staff	552 <sup>nd</sup> ACW, USAF	Operations

Follow-Up Procedures – After the start of the research the proxy agents were contacted on a periodic basis to determine the status of their efforts and if further support, or additional packets were required.

### Translation of Data

Center for the Study of Ethical Development (CSED) – The CSED began during the early 1970s as an informal discussion group that catered to many of the academic disciplines within the University of Minnesota where students, academics, and professors would share experiences, ideas, and concepts. In 1982 the informal group was established as the Center for Ethical Development with Dr. James Rest as the research director. Dr. Rest died in 1999 and the directorship went to Dr. Darcia Narvaez. The primary function of the CSED has been to conduct and support research utilizing the DIT developed by Rest during the 1970s. Currently, the CSED has expanded its focus beyond the DIT to newer research tools designed to enhance knowledge of moral development. The Four Component Model best defined this expanded focus (Table XVIII).

TABLE XVIII

PSYCHOLOGICAL COMPONENTS THAT  
DETERMINE MORAL BEHAVIOR

Component	Behavior
Moral Sensitivity	Ability to identify moral issues within a situation.
Moral Judgment	Determining which action would be morally right or wrong.
Moral Motivation	Ability to prioritize moral values with respect to other values.
Moral Character	The courage, persistence, focus, and skills to implement.

Note: Source – Rest & Narvaez, 1994.

The CSED made the DIT tests (both DIT1 and DIT2) available for students, faculty members, and academics that are conducting research into moral constructs of different groups or populations. The CSED recommended the use of the DIT2 because it consists of: (1) updated scenarios to reflect more contemporary environments, (2) extended analysis of existing indexes, (3) uses new subject reliability checks, and (4) gathers approximately 50 variables on each subject. A scoring service was provided for those individuals who purchase the DIT2 instrument. The scoring included a preliminary statistical analysis that included the computation of the means and standard deviation for the entire sample. It also includes a t-test for all of the sub-groups within the entire sample as defined by the coded identification number. The service does not execute correlations with other measures, demographic data, or studies (Center for the Study of Ethical Development, 2000).

### Analysis

#### Statistics

CSED Scoring Service – The scoring forms provided with the DIT2 test were optical scanning forms that were keyed to scoring algorithms designed by the CSED to calculate results measured against the stages of moral development.

### Summary

The method described in the paragraphs above provided a means by which to glean sufficient data with which to draw some tentative conclusions. In the next two

chapters the reader will be made aware of the findings of the survey and, in Chapter V, be treated to an interpretation of those findings.

As the reader progresses through the next two chapters, bear in mind this principal question, "Can ethics be taught and, if so, does knowledge of ethics predict behavior?" A competing question, based on the design of this study might also be, "Does the data show a clear need for ethics training?"

As an aside, research has shown that ethics training (moral constructs) can in fact be taught in an academic setting. Longitudinal studies have shown that a clear progression of increased knowledge of higher moral constructs has been a function of increased academic exposure (McNeel, 1991; Penn, 1990; Rest & Narvaez, 1994). However, researchers have determined that the linkage between knowledge of ethics and behavior has been somewhat weaker, albeit consistent and measurable (Rest & Narvaez, 1994).

## CHAPTER IV

### FINDINGS

#### Introduction

#### Restatement of Hypothesis

Differences in the development of moral reasoning of aerospace industry executives, managers, and supervisors as measured by a test to determine one's moral reasoning ability, will produce results that are higher than comparable studies of other industries and disciplines.

#### Population

The target population for this research study, as described in Chapter III, consisted of supervisors, managers, and executive-level management individuals within the various aviation and aerospace organizations. The population was also designed to accommodate flight crewmembers that occupy command status on both commercial and military aircraft. Those individuals were considered to be a part of the *Operations* sub-group. The fundamental criteria for this population was that these target individuals would possess a certain degree of autonomy with regard to their decision-making environment

and were specifically responsible for decisions that had significant impact on organizational missions, products, services, and people.

The DIT2 instrument was projected into the target population with the support and participation of proxy-agents as described in Chapter III. These proxies served in behalf of the principal researcher with regard to the following:

1. Identified and approached qualified participants to solicit their participation in this study.
2. Provided DIT2 questionnaire packets to those individuals who agreed to participate.
3. Provided support to voluntary respondents as necessary.
4. Provided follow-up when and where necessary to assure timely response.

Appendix F, pages F1 and F2 contain tables that reflect the distribution of the DIT2 packets by sub-group and proxy-agent. Table F1 essentially reflects the status accounting of the DIT2 packets by identification number, as assigned to specific sub-group, and the date completed packets were received by the principal researcher. A total of 107 DIT2 Questionnaires were numbered and allocated to each sub-group; however, only 86 were actually delivered to respondents. This was because of requests for specific numbers of packets made by each proxy-agent with regard to the numbers of potential respondents they had successfully recruited. Table F2 reflects the distribution of packets by proxy-agent for each industry segment, or sub-group.

The overall performance of the proxy-agent process is reflected in Figure 7. Out of a total of 86 packets that were delivered to respondents who had volunteered to participate, 51 were actually completed and returned. This constituted a total

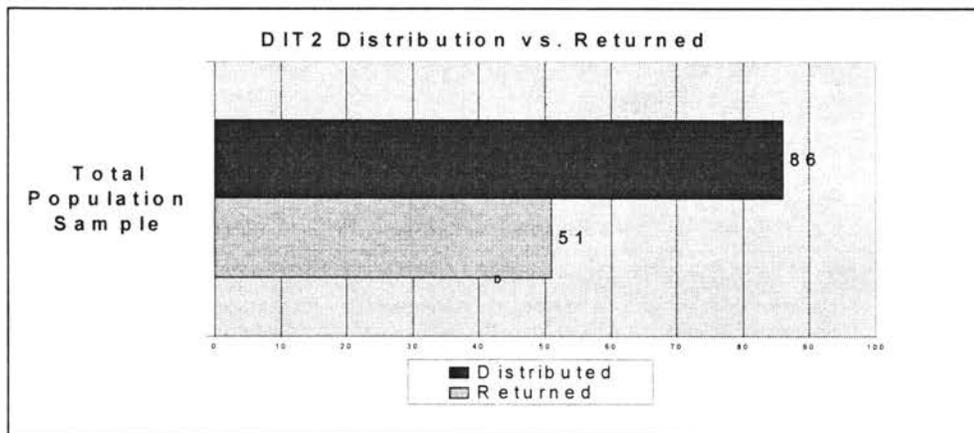


Figure 7. Total Population – DIT 2 Distribution Versus Returned.

participation percentage of 59.3%. The overall performance of the proxy-agent process is reflected in Figure 8 where the participation rate of each sub-group is detailed. The participation rate for the *Aeronautical Center* sub-group was the highest at 80.8%. The

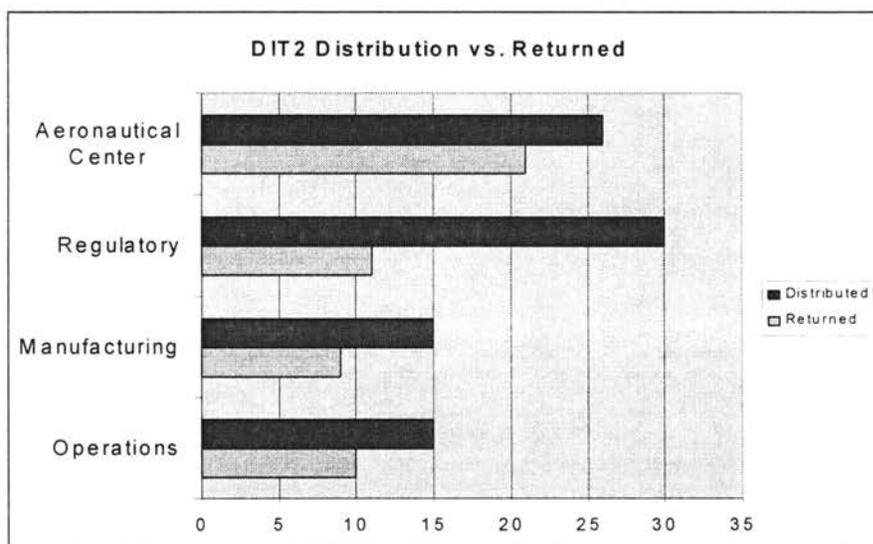


Figure 8. Industry Sub-Group – DIT 2 Distribution Versus Returned.

next highest participation rate was achieved by the *Operations* sub-group with 66.7% completed and returned. Third ranked in participation was the *Manufacturing* sub-group at 60.0%. The lowest rate of participation was achieved by the Regulatory sub-group at 37.7%. This sub-group basically represented the FAA Administrator's offices and the NTSB offices, both located in Washington, DC.

### Instrument

At the completion of the data collection phase of this study the accumulated DIT2 Questionnaires were grouped together in numerical order by the identification number and sent to the Center for the Study of Ethical Development (CSED) in Minnesota. CSED then scored the forms and produced a series of reports and data compilations that are contained in Appendix G.

Part of the scoring of the DIT2 included a series of five reliability checks designed by the CSED to determine if the responses provided by individual respondents are reliable or questionable. The original sample of 51 questionnaires that were forwarded to the CSED for scoring contained 4 questionnaires that suffered invalidation through the reliability checking process and were ultimately purged from the sample. The CSED transmittal letter found in Appendix G (pp. G1-G2) was signed by Narvaez, the CSED Director, and was used to return the scored questionnaires for this study included a paragraph that explains the typical experience encountered with purged data from DIT2 samples. Narvaez states that many DIT2 studies have encountered a purged sample component of 15%. The sampled data for this study realized a loss of only 7.8%, or half of what is considered normal experience (Figure 9).

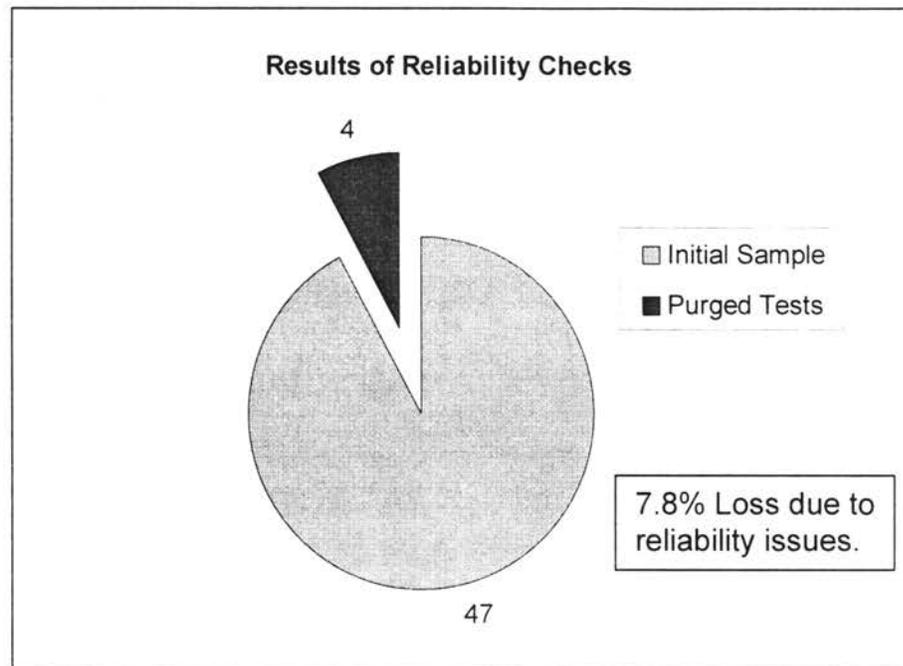


Figure 9. Guidelines for Conducting Survey Research.

## Survey Results

### Population Survey Data

The population survey data is summarized in Appendix H. All individual respondent's data sets are included in the summary, including the 4 sets determined to be invalid and subsequently purged. This master data sheet also contains all of the relevant demographic data collected via the questionnaire.

Population Data Set Compilation – The range of possible scores on the DIT is from 0-95 (Rest, 1979). The overall survey population calculated P-Score was 36.0 and can be found in Table XIX. This P-Score places the aviation and aerospace managers in the 2<sup>nd</sup> quartile of the P-Score distribution range.

TABLE XIX  
 AVIATION AND AEROSPACE POPULATION  
 P-SCORES

Population/Segment	N	Standard Deviation	P-Score
Aeronautical Center	20	14.6	36.1
Regulatory	11	19.9	38.9
Manufacturing	6	9.9	30.7
Operations	10	12.6	36.0
Total Population	47	14.9	36.0

The Mean candidate indexes for the population are reflected in Table XX. For and explanation of the numbers associated with the educational and political view information, see Table XXI.

TABLE XX  
 MEAN INDEXES FOR THE OVERALL  
 SURVEY POPULATION

Index	Value	Explanation
P-Score	36.0	This score reflects moral constructs generally found in Conventional (Appendix I) moral thinking.
Age	46.8	Self explanatory
Education	10.4	This value represents a educational achievement between senior year in college and entry into graduate school (Table XXI).
Political View	3.4	This value represents a political view considered to be mildly conservative.

TABLE XXI  
EDUCATIONAL LEVELS DEFINED FOR DIT2

Level	Description
1	Grade 1 to 6
2	Grade 7, 8, 9
3	Grade 10, 11, 12
4	Vocational/technical school (without a bachelor's degree) (e.g., Auto mechanic, beauty school, real estate, secretary, 2-year nursing program).
5	Junior college (e.g., 2-year college, community college, Associate Arts degree)
6	Freshman in college in bachelors degree program.
7	Sophomore in college in bachelors degree program.
8	Junior in college in bachelors degree program.
9	Senior in college in bachelors degree program.
10	Professional degree (Practitioner degree beyond bachelor's degree) (e.g., M.D., M.B.A., bachelor of Divinity, D.D.S. in Dentistry, J.D. in law, Masters of Arts in teaching, Masters of Education (in teaching), Doctor of Psychology, Nursing degree along with 4-year Bachelor's degree)
11	Masters degree (in academic graduate school)
12	Doctoral degree (in academic graduate school, e.g., Ph.D. or Ed.D.)
13	Other Formal Education
<u>Characterization of Political Views for DIT2</u>	
1	Very liberal
2	Somewhat liberal
3	Neither liberal nor conservative
4	Somewhat conservative
5	Very conservative

Source: Adapted from DIT-2 Answer Sheet.

The P-Score for the total population in addition of the P-Scores for each of the independent sub-groups is reflected in Figure 10.

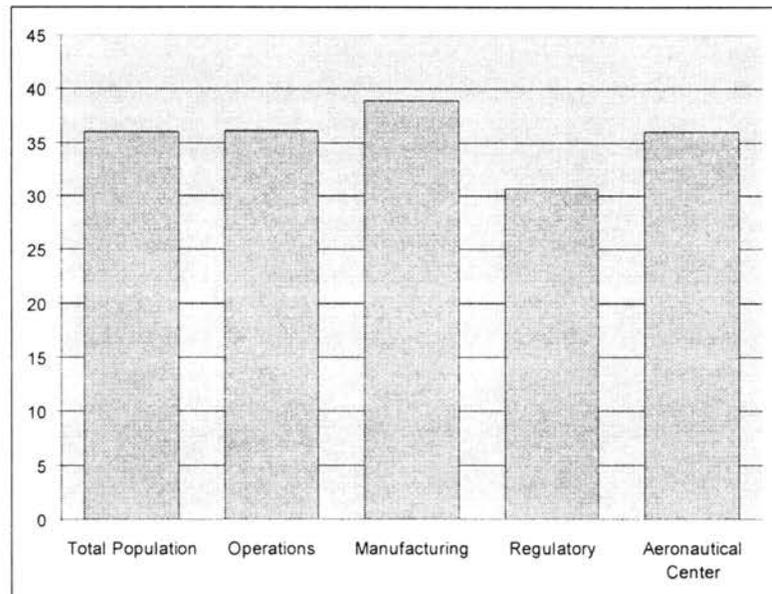


Figure 10. Population P-Scores.

### Sub-Group P-Scores

In an effort to determine the potential P-Score differences among the sub-groups the N, mean, and standard deviation were computed. The data from this compilation was then subjected to a two-tailed t-test (Statistica software package) which produced the following information found in Figure 11:

1. t-test value (t-test for independent samples).
2. Calculated degrees of freedom (df).
3. Probability of the t-value occurring by chance alone (two-tailed test).

		Aeronautical Center	Regulatory	Manufacturing	Operations
Aeronautical Center	t-test	0.000	-0.450	0.849	0.018
	df	0	29	24	28
	probability	0.000	0.643	0.409	0.392
Regulatory	t-test	0.450	0.000	0.943	0.395
	df	29	0	15	19
	probability	0.643	0.000	0.363	0.667
Manufacturing	t-test	-0.849	-0.943	0.000	-0.884
	df	24	15	0	14
	probability	0.409	0.363	0.000	0.395
Operations	t-test	-0.018	-0.395	0.884	0.000
	df	28	19	14	0
	probability	0.392	0.667	0.395	0.000

Figure 11. Sub-Group Matrix.

### Demographic Issues

Demographic information was collected via the DIT2 questionnaire on all respondents. It included data reflecting the following formation: (1) gender, (2) age, (3) educational development, (4) political inclinations, (4) nationality, and (5) whether English was the respondent's primary language. The data is reflected in Appendix J. As discussed earlier in this study the sampling technique executed was basically a combination of *purposive/cluster* methodologies. Consequently, because this process was not a classic *random sampling*, the resulting data should not be considered of a quality that would lend itself to exploration and generalization with inferential statistics. Although not specifically addressed in the hypothesis, or the research plan detailed in Chapter III of this study, it is presented as anecdotal information that will be addressed in the recommendations for further study to be presented in Chapter V.

## Comparison Data Sets

The following narrative and data represent a compilation of P-Scores from a variety of studies conducted in a number of different segments of our culture. They are primarily provided for comparative purposes to create a background against which the P-Score resulting from this study can be better understood. In effect, they will establish the context within which a better understanding of the ethical construct and decision-making activity of aviation and aerospace management can be presented and discussed.

### P-Scores from Different Groups

Table XXII reflects an eclectic group of P-Scores from a variety of studies included in Moral Development in the Professions, (Rest & Narvaez, 1994). The lowest P-Score reported is that of institutionalized delinquents at 18.9, and ranges to a high of 65.2 for moral philosophy and political science graduate students. The Aviation and Aerospace management P-Score of 36.0 has been inserted at the appropriated place for comparative purposes. In addition to the accumulation of P-Scores to compare with the aviation and aerospace management study results, it also represents the diversity of areas and groups studied with the DIT instrument. The P-Score for aviation and aerospace managers is placed in the 2<sup>nd</sup> quartile of this distribution.

TABLE XXII  
DIFFERENT GROUPS ON THE DIT P-SCORE

P-Score	Group
65.2	Moral philosophy and political science graduate students.
59.8	Liberal protestant seminarians
52.2	Law students
50.2	Medical students
49.2	Practicing physicians
47.6	Dental students
46.3	Staff nurses
42.8	Graduate students in business
42.3	College students in general population
41.6	Navy enlisted men
40.0	Adults in general population
36.0	Aviation & Aerospace Management
31.8	Senior high school students
23.5	Prison inmates
21.9	Junior high school students
18.9	Institutionalized delinquents

Note: Aviation & Aerospace Management P-Score inserted by researcher for comparative purposes; Source – Adapted from Rest & Narvaez, 1994.

#### Accounting/Auditing Professionals

Considerable amounts of moral/ethical research had been conducted utilizing the DIT format in the field of accounting. The studies have been focused on practitioners within the profession (e.g., CPA, employees of accounting firms, auditors) and accounting students in predominately educational institutions (accounting students will be discussed in the following section). P-Scores for the various groups of accounting practitioners are reflected in Table XXIII. The scores range from a low of 32.2 for Partner-level accountants to 49.6 for Senior-level female accountants. The Aviation and

TABLE XXIII  
P-SCORE MEANS FROM ACCOUNTING  
PROFESSIONALS

P-Score	Accountant Group
49.6	Senior-level female accountants
47.7	Accountants with liberal arts education
46.8	Supervisory-level accountants
44.7	Accountants at the staff level
44.2	Canadian auditors
43.6	Third-year staff accountants
43.0	Second-year staff accountants
42.4	Accounting seniors
41.9	Accounting managers
41.4	Accounting seniors
41.4	Senior-level male accountants
41.0	First-year staff accountants
40.0	American auditors
39.8	Accountants at the staff level
38.6	Internal and governmental auditors
38.5	CPA Respondents, 1985 (Ponemon & Glazer, 1990)
38.5	Manager-level accountants
38.1	Accountants (general sample)
38.1	Accountants with business education
38.1	Senior manager-level accountants
38.1	CPA Respondents, 1987 (Ponemon & Glazer, 1990)
37.1	CPA Respondents, 1984 (Ponemon & Glazer, 1990)
37.1	Partner-level accountants
36.0	Aviation & Aerospace Management
35.7	Manager-level accountants
35.6	Senior-level male accountants
32.2	Partner-level accountants

Note: Aviation & Aerospace Management P-Score inserted by researcher for comparative purposes; Source – Adapted from Rest & Narvaez, 1994, except where other source noted.

Aerospace management P-Score of 36.0 has been inserted at the appropriated place for comparative purposes. The P-Score of 36.0 is fixed in the 1<sup>st</sup> quartile of this distribution

of scores. Rest and Narvaez included a compilation of the various studies conducted in the accounting field in their book Moral Development in the Professions because of the complex variables associated with this discipline regarding reasoning capability, moral judgment opportunities, and professional responsibilities.

The DIT had been used extensively to quantify, and ultimately generalize, about the moral constructs that could be found within the accounting field. Researchers Arnold and Ponemon have identified three basic benefits that were derived from this type of research (Rest & Narvaez, 1994):

1. Provided insight into the latent levels of reasoning used by practicing accountants in their resolution of ethical dilemmas.
2. Provided insight into problems caused by differences in ethical judgment among practicing professionals.
3. It identified the means assist in influence the enhancement of ethical propriety within the profession.

### Accounting Students

In a companion study, also included in Moral Development in the Professions, Rest and Narvaez discuss the results of DIT research conducted on accounting students in various stages of education within the college and university environments. As can be seen in Table XXIV, the P-Scores range from a low of 34.5 for undergraduate accounting majors to a high of 47.4 for liberal arts accounting seniors (Rest & Narvaez, 1994). The aviation and aerospace managers P-Score of 36.0 has been inserted into this distribution of scores and is fixed within its 1<sup>st</sup> quartile.

TABLE XXIV  
P-SCORE MEANS FOR ACCOUNTING STUDENTS

P-Score	Student Group
47.4	Liberal arts accounting seniors
45.8	Female accounting major
45.1	Accounting majors in ethics course
41.8	Graduate-level accounting majors
38.6	Graduate-level accounting major
37.4	Business school accounting seniors
37.1	Business school accounting majors
36.3	Male accounting majors
36.0	Aviation & Aerospace Management
35.5	Business school accounting majors
34.5	Undergraduate accounting majors

Note: Aviation & Aerospace Management P-Score inserted by researcher for comparative purposes. Source – Adapted from Rest & Narvaez, 1994.

Ponemon and Glazer (1990) studied the ethical development of both students and alumni in the accounting field from two specific educational institutions. They found that the moral reasoning abilities of students, as measured by the DIT, increased during the college years at both of the educational institutions and reflected similar results as reported in Table XXIV (Ponemon & Glazer, 1990). The effect of increased moral reasoning abilities associated with increasing levels of education has been suggested in many different studies and has been addressed below.

#### P-Score Comparisons of Education and Gender

The P-Score results reported in Table XXV represent a compilation of a variety of studies that have looked at the identified variables. The importance of this information is

found in the anecdotal demographic information reported in this study. It will be discussed in more detail with regard to additional areas proposed for research in Chapter V of this study. However, Rest (1986) conducted a longitudinal study that spanned ten years and focused on the demographical aspects of moral development as measured by the DIT. Chronological age has always been a predictor of increasing moral judgment in an individual; however, one of the more important findings reported by Rest was that the *degree of education* was the single most powerful predictor in the development of moral judgment. Rest also observed that the increases in moral judgment (DIT scores) tended to continue as long as the individual continued within a formal educational process however the trend tended to asymptote at the point the educational process ended (Rest, 1986).

TABLE XXV

## AVERAGE DIT P-SCORE BY EDUCATION AND GENDER

Education	Males	Females
Graduates	61.0	63.0
Aviation & Aerospace Management	-	52.4
College	44.1	45.9
Aviation & Aerospace Management	32.2	-
Senior High School	28.7	30.4
Junior High School	19.1	19.8

Note: Aviation & Aerospace Management P-Scores inserted by researcher for comparative purposes. Source – Adapted from Rest & Narvaez, 1994.

Longitudinal studies conducted by Rest and others have also established gender as a factor in predicting moral development. Rest states that at every educational level,

females tend to score higher than males (Rest, 1986). Goolsby and Hunt (1992) conducted a study of the cognitive moral development (CMD) of marketing executives. A segment of their study plan involved the utilization of the DIT to measure moral development. Their findings indicated women scored significantly higher than men with regard to the P-Score. A remarkable aspect to their study was that the women sub-group in their population sample were younger and less educated than the male sub-group (Goolsby & Hunt, 1992). Bendixen, et al, conducted a study that examined the relationship between education, gender, syllogistic reasoning skill, epistemic beliefs, and moral reasoning in adults. Their study also suggested strong evidence for increased capacity for moral judgment by women compared to men (Bendixen, et al., 1998).

#### Coast Guard Study of Gender

White (1999) conducted a study to investigate the effects of gender upon moral development. In the development of his study he noted that very little research regarding moral development had been conducted in the public sector (government). His study was focused on United States Coast Guard personnel with specific emphasis on gender. The resulted P-Scores are reflected in Table XXVI.

White (1999) found that both at the enlisted level and the commissioned officer level females consistently scored higher than their male counterparts. White suggested that further research into the reasons for differences between female and male moral development should be conducted (White, 1999).

TABLE XXVI  
AVERAGE DIT P-SCORE FROM COAST GUARD STUDY

Population Groups	Males	Females
Aviation & Aerospace Management Officers	37.3	52.4
Aviation & Aerospace Management Enlisted personnel	32.2	43.1
	30.6	34.4

Note: Aviation & Aerospace Management P-Scores inserted by researcher for comparative purposes. Source – Adapted from White, 1999.

### Educational Studies

Numerous educational related studies have been done with the DIT instrument. The compilation of studies reflected in Table XXVII represents pre-test/post-test longitudinal studies conducted on college students at various types of colleges and universities. The average change in P-Scores for those educational institutions was 9.1 points, including a -0.2 change posted by Columbia Bible. This data suggests progressive formal education is a strong predictor of increased moral judgment (Rest & Narvaez, 1994).

Although research has indicated that increasing formal education is a valid predictor of enhanced moral and ethical developed there have been questions as to whether actual courses in applied ethics and moral constructs are effective as intervention type educational methodologies. Rest and Narvaez (1982) reports the results of a longitudinal study on dental students and practitioners with regard to various measures of moral constructs, one of which was the DIT. The dependent variable in the study was a

TABLE XXVII  
LONGITUDINAL STUDY OF FRESHMAN –  
SENIOR COMPARISONS

College/University	Longitudinal Results					
	Fr.	Sr.	N	SD	Chg.	d
Liberal Arts Colleges:						
Subject study	35.7	46.4	216	11.62	10.7	.92
Alverno	35.6	47.4	70	11.53	11.8	1.02
Bethel	37.3	47.7	28	14.39	10.4	.72
Wheaton	41.5	52.4	44	17.22	10.9	.63
Bible Colleges:						
Columbia Bible	33.4	33.2	54	12.73	-0.2	.02
Universities:						
U. California, Irvine	36.9	48.1	95	13.26	11.2	.84
West Point	34.4	43.3	104	11.83	8.9	.76

Note: Source – Adapted from Rest & Narvaez, 1994.

specially developed remedial course on moral constructs with respect to applied ethics.

Table XXVIII reflects the pretest and posttest scores. The conclusion supports the

TABLE XXVIII  
PRETEST VERSUS POSTTEST OF ETHICS EDUCATION

Component	n	Pretest		Posttest		p
		Mean	SD	Mean	SD	
Ethical Sensitivity (DEST Scores)	15	44.054	6.39	56.72	10.93	<.006
Moral Reasoning (DIT Scores)	16	39.38	12.36	49.96	12.48	<.0005
Role Concept (Essay Scores)	17	3.05	1.78	11.06	1.25	<.0001

Note: Source – Adapted from Rest & Narvaez, 1994, p. 127.

position that ethics can have an effect on moral constructs when taught in an academic environment. There was nearly a ten point increase between pretest and posttest.

### Summary

The research plan for this study projected a total of 86 questionnaires into the aviation and aerospace industry population. Fifty-one respondents out of that initial effort agreed to participate by answering and returning the questionnaire forms. Subsequent reliability checks eliminated four of those respondents as a result of incomplete or inconclusive responses. Consequently, the functional sample for this population was fixed at 47, or 59.3% of the total sample. This included respondents from all four of the identified sub-groups of the major population. The resulting computations produced a P-Score for the target population of 36.0. In comparison of that score with previous studies of professional and student groups the study group was placed between high school students and adults in the general population. All comparisons of the P-Score of 36.0 with other studies placed it in the 1<sup>st</sup> or low-2<sup>nd</sup> quartile.

Demographic data was also obtained via the questionnaire; however, since this was a *descriptive study* that utilized a *purposive/cluster sampling technique* no inferential statistical study was conducted. The information was provided as anecdotal and to support suggestions for further study.

## CHAPTER V

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

##### Plato's Allegory of *The Cave*

“Next, then,” I said, “make an image of our nature in its education and want of education, likening it to a condition of the following kind. See human beings as though they were in an underground cave-like dwelling with its entrance, a long one, open to the light across the whole width of the cave. They are in it from childhood with their legs and necks in bonds so that they are fixed, seeing only in front of them, unable because of the bond to turn their heads all the way around. Their light is from a fire burning far above and behind them. Between the fire and the prisoners there is a road above, along which see a wall, built like the partitions puppet-handlers set in front of the human beings and over which they show the puppets.” (Plato, 1968, p. 193) (Appendix K)

Plato's allegory of “The Cave” has been used over the ages in various ways to illustrate man's state of awareness. The allegory itself is nearly 2,500 years old and yet it still provides a powerful statement about man's condition. For this study the existence within the *cave* is representative of the *Conventional* level of moral development as defined by Kohlberg (1984) (Appendix I). This level of moral reasoning is reflected by an individual's tendency to perform, or behave, in a manner that would be supportive and expected by society at large. This involves maintaining conventional social order and a desire to please others. This level of moral reasoning defines stages three and four of

Kohlberg's six stages of moral development. Stage 3 of Kohlberg's moral development theory basically reflects a desire to achieve one's own objectives by being nice to others. Stage 4 introduces the morality of law and duty to the social order one lives within. This stage essentially becomes the morality that binds communities together but does not represent the higher concerns for human rights to the most basic principles, social order notwithstanding. The chained humans in *The Cave* represent individuals who would normally be cast into roles (*Conventional level of moral reasoning*) predetermined by a variety of social and personal constraints designed to encourage and reward a particular type of decision-making. In the aviation and aerospace community the paramount focus should be on the welfare of society in general, and specifically the safety of the flying public, which implies a Postconventional approach to decision-making ethics.

Moral constructs and ethical behavior with respect to decision-making practices within the corporate environment are indelibly linked. Applied ethics has become a prerequisite element within educational institutions where the practitioner disciplines of law, medicine, engineering and others are taught. This has come about as a result of society's need for the public good to be supported, protected and assured by those professions upon which society builds its infrastructure (Harris, et al., 2000). Although the aviation and aerospace industry has become a critical element of society's infrastructure with regard to public transportation capabilities, space research and the economy, very little, if any, ethics-based training specifically exists for individuals who work within that industry. Therefore decisions, policies, and programs that often have a significant impact on society, and the safety of the flying public, are being executed

without benefit of decision models that reflect the higher levels of *Conventional*, or *Postconventional*, moral constructs.

The aviation industry has long professed to have safety as its highest priority. However, when reviewing literature that should otherwise reflect this priority, *safety*, or *decision-making ethics*, as a priority is rarely mentioned. Indeed, research has indicated that ethics is mostly mentioned in the context of business activities and relationships between employer and employee. The focus on ethical decision-making, and the latent effects of decisions with regard to safety could not be found.

This study included the research of four separate aviation accidents, one of which was the Space Shuttle Challenger event that occurred in 1986. These accidents were studied to determine the extent to which latent issues, as defined by Reason's Model (Reason, 1990), were a critical factor in the actual accident itself. In every case there were critical decisions made that if had been made differently, or perhaps for different reasons, arguably could have eliminated the potential for an accident, if not precluded it entirely. Aviation, as a practice, involves a particularly unforgiving characteristic of physics – gravity. Millions of dollars and hundreds of lives can be held in the balance of a poorly conceived design, procedure, or decision that may not have been considered in the light of a Postconventional process. Although researchers have long agreed that knowledge of ethics is not predictably linked to ethical behavior there are indications that individuals who have been exposed to higher levels of education are inclined make higher-level decisions. This supports the notion that ethical behavior can be influenced by exposure to various types of ethical training and education (Rest & Narvaez, 1994) (Table XXVIII).

## Study Overview

Purpose of the Study – The purpose of this study was to examine ethical standards as they related to decision-making criteria of mid-level and above executives within selected major aviation and aerospace organizations in the United States.

Hypothesis Restatement – Differences in the development of moral reasoning of aerospace industry executives, managers, and supervisors as measured by a test to determine one's moral reasoning ability, will produce results that are higher than comparable studies of other industries and disciplines.

## Conclusions

### Comparisons with the General Population

The comparisons of the aviation and aerospace managers' mean P-Score with those of other groups studied within the general population included a range that began with institutionalized delinquents (P-Score of 18.9) to moral philosophy and political science graduate students (P-Score of 65.2) (Table XXIII).

Findings – Aviation and aerospace managers scored in the 2<sup>nd</sup> quartile of this group. Their score of 36.0 was 2 points below that scored by the general population and nearly 6 points below the score of *Navy enlisted men*. They were also more than 13 points below the *practicing physician* P-Score of 49.2.

The average age of this study's respondent was 46.8 and an average education level fixed between a bachelor degree and graduate school.

Interpretation – The linear interpretation of this finding was that aviation and aerospace managers had not experienced the moral development realized by those groups with P-Scores fixed above their posted score of 36.0.

#### Comparisons with the Accounting Profession

DIT studies within the accounting community have been numerous and provide a large base of scores derived from a common profession. The scores in this battery of studies for accounting professionals (Table XXIV) ranged from 32.2 to 49.6.

Findings – The comparisons of aviation and aerospace manager P-Scores with the prolific studies conducted in the accounting community placed the managers within the 1<sup>st</sup> quartile of the accounting professional studies (Table XXIV) and the accounting students studies (Table XXV).

Interpretation – In a similar fashion experienced in the comparisons with the general population aviation and aerospace managers do not reflect the level of moral development exhibited by a large number of groups within the accounting community. Twenty-three studies focus on different groups within the accounting profession posted higher scores than the P-Score of 36.0. Only three groups scored lower than the aviation and aerospace managers.

The Center for the Study of Ethical Development (CSED) states that generally a P-Score of 55.0 or above is a strong indication of Postconventional moral reasoning. Therefore, a score of 36.0 strongly suggests a Conventional construct at work in the decision-making processes of DIT respondents. Written reprint/adaptation permission

was obtained from the CSED for all materials and information used in this study (Appendix L). The aviation and aerospace managers consistently scored in either the 1<sup>st</sup> or 2<sup>nd</sup> quartile of every comparison executed in this study. Therefore the hypothesis of this study is considered to be false.

### Recommendations

*Conventional reasoning* processes reflect the desire to follow societal standards and be accepted by one's group. As stated early there are no rewards or inducements for looking for, or considering solutions that may be counter to group standards and expectations. Consequently, the safety element considered to be an institutional, if not always stated, priority within the aviation and aerospace community may be exerting a convoluted influence on the decision-making processes. As noted in the discussion of the deliberations and decisions surrounding the Space Shuttle Challenger, out-of-the-box (*Postconventional*) thinking was often only tolerated and never rewarded. While Conventional processes might assure that a standard considered to be safe will be met and enforced, it does not provide for innovative, non-standard approaches to assure the *standard* remains safe against unknown variables. This is the realm of *Postconventional reasoning*.

### Recommendations for a Code-of-Ethics

As stated in Chapter II of this study other professional disciplines have developed, maintained, and enforced Codes of Ethics as a way of articulating professional behaviors that essentially reflect *Postconventional reasoning*. A *code of ethics* specifically designed

for general application within the aviation and aerospace industry did not exist primarily because it has not yet been recognized as a singular discipline. Consequently, as a result of the findings of this study and guidelines for professional (ethical) behavior established by other professional disciplines, a series of behavioral standards (Figure 12) are proposed for this industry.

### Recommendations for an Aviation and Aerospace

#### Oriented Ethics Course

This course would resemble engineering ethics syllabi that have been defined for the engineering departments with the exception that it would involve only aviation related applications. The major areas that would be addressed by this proposed course would include the following:

1. Philosophical foundations of moral constructs and ethics
2. Understanding aviation as a professional discipline
3. Reason's Model, latent issues, and managing consequences
4. Ethics in the context of the aviation and aerospace industry
5. Ethical problem identification, understanding, and resolution
6. Professional characteristics of responsibility, integrity, reliability, etc.
7. Aviation related case studies

A more complete proposed syllabus for a course of this type can be found in

Appendix M.

## AVIATION AND AEROSPACE CODE of ETHICS

### The Fundamental Principles

The aviation and aerospace industry is the manifestation of man's destiny to venture into the realm of atmospheric flight, into space, and, ultimately beyond Earth. Because of the nature and variety of skills necessary to maintain and advance the technology of flight the industry is populated by a variety of professional disciplines. However, as a result of the growing importance of flight to our culture, economy, and destiny it is essential that we recognize the responsibilities and obligations aviation and aerospace professionals have with regard to society in general and the flying public specifically. Aviation and aerospace professionals shall uphold the integrity, honor and dignity of the profession by:

- I. Using their knowledge and skill for the enhancement of human welfare.
- II. Being honest and impartial, and serving with fidelity the public, their employers and clients.
- III. Striving to increase the competence and prestige of the aviation and aerospace profession.
- IV. Supporting the professional and technical societies of their independent disciplines.

### The Fundamental Canons

Aviation and aerospace professionals shall subscribe to the following:

1. They shall accept responsibility for making decisions consistent with the safety, health and welfare of society in general and the flying public specifically, and to disclose promptly factors that might endanger the public or the environment.
2. They shall perform services only within the area of their expertise.
3. They shall conduct their business for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest or the appearance of conflicts of interest.
4. They shall build their professional reputation on the merit of their services and shall not compete unfairly with others.
5. They shall associate only with reputable persons or organizations.
6. They shall issue public statements only in an objective and truthful manner and only when supported by fact and reliable observation.
7. They shall continue their professional development throughout their careers and shall provide opportunities for the professional and ethical development of those for whom they are responsible.

Figure 12. Aviation and Aerospace Code-of-Ethics.

### Further Research

The Center for the Study of Ethical Development (CSED) has stated this study is the first of its kind to utilize the DIT instrument in the study of the aviation and aerospace industry. It is also one of the first that included a component of the government bureaucracy. From that perspective this study has indicated that considerable opportunity exists for more in-depth research into the moral constructs and reasoning that constitutes decision-making within all components of the aviation and aerospace industry. As stated earlier this study was considered descriptive research designed to identify and describe decision-making ethics within the industry. Consequently, population definition, sampling techniques, sample size, and statistical applications would not support generalizations of the target population with inferential statistics. This has become the basis for recommendations of further research.

Ethics and the Regulator Responsibility – The aviation and aerospace managers' P-Score of 36.0 reflects a moral reasoning of the Stage 3 or 4 type as defined by Kohlberg and evaluated by the DIT test. This represents a Conventional level of moral reasoning, which may be effected by other unique components within the industry that this study did not evaluate. As discussed above the *safety* priority within the industry may be having a convoluted effect on decision-making activity. Social and group expectations, or the perception of those expectations, may discourage managers in the industry to venture beyond known boundaries that define aviation safety. It is recommended that a study be

designed to consider if this cultural expectation is manifest and, if so, the degree to which it effects decision-making within the industry.

Demographic Longitudinal Study – This study produced demographic data on the respondents in additions to their responses to the DIT2 Questionnaire. However, due to the nature of the study and the manner in which the study was designed and executed the application of inferential statistics would not have been applicable. However, although the demographical information was admittedly anecdotal it did suggest that a more detailed study would be indicated. As an example, other studies were discussed that indicated moral judgment differences with regard to gender, education, and age. It would be appropriate to design a *causal-comparative study* that would explore the effect of those demographics with respect to DIT2 scores.

### Summary

“And if,” I said, “someone dragged him away from there by force along the rough, steep, upward way and didn’t let him go before he had dragged him out into the light of the sun, wouldn’t he be distressed and annoyed at being so dragged? And when he came to the light, wouldn’t he have his eyes full of its beam and be unable to see even one of the things now said to be true?”

“No, he wouldn’t,” he said, “at least not right away.”

“Then I suppose he’d have to get accustomed, if he were going to see what’s up above. At first he’d most easily make out the shadows; and after that the phantoms of the human beings and the other things in water; and, later, the things themselves. And from there he could turn to beholding the things in heaven and heaven itself, more easily at night—looking at the light of the stars and the moon—than by day—looking at the sun and sunlight.”

“Of course.”

“Then finally I suppose he would be able to make out the sun—not its appearances in water or some alien place, but the sun itself by itself in its own region—and see what it’s like.”

“Necessarily,” he said.

“And after that he would already be in a position to conclude about it that this is the source of the seasons and the years, and is the steward of all things in the visible place, and is in a certain way the cause of all those things he and his companions had been seeing.” (Plato, 1968, pp.194-195) (Appendix K)

Plato’s allegory of *The Cave* ends with the previously chained individual being brought out of the subterranean space into the light of the world. Here the person is forced to deal with a reality different than his senses, experience, and intuition would normally allow. But, ultimately, the truth of it all cannot be denied and the individual is changed forever. Basically, this represents a move from *Conventional* reasoning to a place where *Postconventional* reasoning prevails.

This study strongly suggests that aviation and aerospace managers are positioned within an environment where *Conventional* reasoning is the norm. The effect this can have on decision-making ethics can be profound if the needs of humankind become different than those of a single culture or group. In an era of growing emphasis on the global economy and an increasing dependence on aviation and aerospace capabilities it seems that a different kind of moral reasoning may be indicated to support decision-making ethics. While research has indicated that knowledge of morals and ethics does not necessarily predict moral or ethical behavior, there are indications that education in ethics at least produces different decision models for individuals to consider in their professional activities. Therefore it is reasonable that the developing and teaching of decision-making ethics to aviation and aerospace professionals can have a profound effect

on an individual's ability to effectively manage consequences in the exceptionally complex and risk-prone realm of flight.

## REFERENCES

Agarwal, J., & Malloy, D. (2000). The role of existentialism in ethical business decision-making. Business Ethics: A European Review, 9(3), 143-155.

Anderson, A. James R. Rest (1941-1999) [Online]. Available: <http://www.coled.umn.edu/alum/link/a999fall/jamesre.html>[2000, April 17].

Aristotle. (1999). Nicomachean ethics (T. Irwin, Trans.). Indianapolis, IN: Hackett Publishing Company. (Original work published 350 B.C.)

Aronfreed, J. (1968). Conduct and conscience. New York, NY: Academic Press.

Audi, R. (Ed.). (1999). The Cambridge dictionary of philosophy (2nd ed.). New York, NY: Cambridge University Press (Original work published 1995).

Baier, A. (2000). Hume, David. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Baldwin, T. (2000). Moore, George Edward. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Bartlett, A., & Preston, D. (2000). Can ethical behaviour really exist in business?. Journal of Business Ethics, 23(2), 199-209.

Blanchard, K., & Peale, N. (1988). The power of ethical management. New York, NY: Ballantine Books.

Boeing (2000, September) [On-line]. Ethics and Business Conduct. Available: <http://www.boeing.com/companyoffices/aboutus/ethics/index.htm>

Bombardier. (1992). Learjet (2nd ed.) [Brochure]. Canada: Miller, E..

Bombardier. (1994). Code of Ethics [Brochure]. Canada: Beaudoin, L..

Bridges, T., Aristotle's Ethics [Online]. Available: [http://www.msu.org/intro/content\\_intro/texts/aristotle/aristotle\\_ethics.html](http://www.msu.org/intro/content_intro/texts/aristotle/aristotle_ethics.html) [2000, July 16].

Brown, M. (1996). The ethical process: A strategy for making good decisions. Upper Saddle River, NJ: Prentice Hall.

Bruce, W., & Russel, V. (1997). NASA and ethics: Training and practice. Journal of Air Transportation World Wide, 2(1), 23-37.

Bunnin, N., & Tsui-James, E. (Eds.). (1996). The Blackwell companion to philosophy. Cambridge, MA: Blackwell Publishers Ltd.

Callahan, A. (1992). A mathematical approach to understanding the diversity of ethical decision making. Industrial Management, 34(4), 7-12.

Center for the Study of Ethical Development. (1998). Guide for DIT-2 [Brochure]. Minneapolis, MN: Rest, J., & Narvaez, D.

Center for the Study of Ethical Development [Online]. Available: [http://www.coled.umn.edu/CSED/dit\\_center.html](http://www.coled.umn.edu/CSED/dit_center.html) [2000, May 2].

Colby, A., & Kohlberg, L. (1987). The measurement of moral judgment (Vols. 1-2). New York, NY: Cambridge University Press.

Collins, D. (2000). The quest to improve the human condition: The first 1,500 articles published in *Journal of Business Ethics*. Journal of Business Ethics, 26(1), 21-26.

Covey, S. (1992). Principle-centered leadership (1st ed.). New York, NY: Simon & Schuster Inc.

Davis, M. (1999). Is University teaching of \_\_\_\_\_ a profession? Professional Ethics, 7(2), 41-52.

Denise, T., Peterfreund, S., & White, N. (Eds.). (1996). Great traditions in ethics. (8<sup>th</sup> ed.). Belmont, CA: Wadsworth Publishing Company.

Engineering Ethics [Online]. Available: <http://lowery.tamu.edu/ehitics/> [2000, September]

Etheredge, J. (1999). The perceived role of ethics and social responsibility: An alternative scale structure. Journal of Business Ethics, 18(1), 51-64.

Farrell, B., & Cobbin, D. (1999). The codes of ethics used by the professions in Australia. Professional Ethics, 7(2), 23-36.

Federal Aviation Administration [Online]. FAA Strategic Plan - 1998 Available: <http://www.faa.gov/safety2.htm> [2000, April 17].

Frey, B. (2000). The impact of moral intensity on decision making in a business context. Journal of Business Ethics, 26(3), 181-195.

Fritzche, D. (2000). Ethical climates and the ethical dimension of decision making. Journal of Business Ethics, 24(2), 125-142.

Gay, L. (1996). Educational research. Columbus, OH: Prentice-Hall, Inc.

Gopnik, A. (2000). Piaget, Jean. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Gill, L., & Magee, C. Lawrence Kohlberg's stages of moral development [Online]. Available: <http://moon.pepperdine.edu/gsep/class/ethics/kohlberg/> [2000, April 17].

Goetsch, D., & Davis, S. (1997). Introduction to total quality. Columbus, OH: Prentice Hall.

Gottlieb, J., & Sanzgiri, J. (1996). Towards an ethical dimension of decision making in organizations. Journal of Business Ethics, 15(12), 1275-1286.

Gouinlock, J. (2000). Dewey, John. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Gray, S. (1996). Avoiding on-the-edge ethical choices. Association Management, 48(13), 112-113.

Guyer, P. (2000). Kant, Immanuel. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Harris, C., Pritchard, M., & Rabins, M. (2000). Engineering ethics - Concepts and cases (2nd ed.). Belmont, CA: Wadsworth (Original work published 1999).

Harris, J., & Sutton, C. (1995). Unraveling the ethical decision-making process: Clues from an empirical study comparing Fortune 1000 executives and MBA students. Journal of Business Ethics, 14(10), 805-818.

Higgs-Kleyn, N., & Kapelianis, D. (1999). The role of professional codes in regulating ethical conduct. Journal of Business Ethics, 19(4), 363-374.

Hoban, F.T. (Ed.). (1989). Issues in NASA program and project management. Washington, D.C.: NASA.

Hoban, F.T. (Ed.). (1993). Issues in NASA program and project management. Washington, D.C.: NASA.

Hosmer, L. (2000). It's time for empirical research in business ethics. Business Ethics Quarterly, 10(1), 33-242.

Hosmer, L. (1994). Moral leadership in business. Burr Ridge, IL: Richard D. Irwin.

Hosmer, L. (1998). Lessons from the wreck of the Exxon Valdez: The need for imagination, empathy, and courage. Business Ethics Quarterly, Special Issue #1, 109-122.

Isaac, S., & Michael, W. (1995). Handbook in research and evaluation (3rd ed.). San Diego, CA: Educational and Industrial Testing Services (Original work published 1971).

Irwin, T. (1995). Plato's ethics. New York, NY: Oxford University Press.

Irwin, T. (2000). Aristotle. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Johnson, N., & Ohmer, D. (1998). Issue-contingent effects on ethical decision making: A cross-cultural comparison. Journal of Business Ethics, 17(4), 373-390.

Jones, T. (1991). Ethical decision making by individuals in organizations: An issue-contingent Model. Academy of Management Review, 16, 366-395

Kaptein, M., & Van Dalen, J. (2000). The empirical assessment of corporate ethics: A case study. Journal of Business Ethics, 24(2), 95-114.

Kohlberg, L. (1986). Essays on moral development: The nature and validity of moral stages (Vol. 2). San Francisco, CA: Harper & Row.

Libby, B., & Agnello, V. (2000). Ethical decision making and the law. Journal of Business Ethics, 26(3), 223-232.

Mike Monroney Aeronautical Center [Online]. Available: <http://www.mmac.jccbi.gov/MMAC/> [2000, May 2].

McClennen, E. (1999). Moral rules as public goods. Business Ethics Quarterly, 9(1), 103-126

McKenna, R. (1996). Explaining amoral decision making: an external view of a human disaster. Journal of Business Ethics, 15(6), 681-695.

McNeel, S. (1991). Christian liberal arts education and growth in moral judgment. The Journal of Psychology and Christianity, 10(4), 311-322.

Modgil, S., & Modgil, C. (Eds.). (1986). Lawrence Kohlberg: Consensus and controversy (1st ed.). Philadelphia, PA & London, UK: The Falmer Press.

Morgan, M. (July 1993). Risk analysis and management. Scientific American, 269(1), 32-41.

Munsey, B. (Ed.). (1980). Moral development, moral education, and Kohlberg. Birmingham, AL: Religious Education Press, Inc.

National Transportation Safety Board. (1994). Aircraft accident report: Northwest Airlin flight 5719 (NTSB/AAR-94/05). Washington, D.C.: NTSB.

National Transportation Safety Board. (1995). Aircraft accident report: Valujet Airlines flight 597 (NTSB/AAR-96/03). Washington, D.C.: NTSB.

National Transportation Safety Board. (1996A). Aircraft accident report: Valujet Airlines flight 592 (NTSB/AAR-97/06). Washington, D.C.: NTSB.

National Transportation Safety Board. (1996B). Aircraft accident report: Korean Air flight 801 (NTSB/AAR-00/01). Washington, D.C.: NTSB.

Nijhof, A., Fisscher, O., & Looise, J. (2000). Coercion, guidance and mercifulness: The different influences of ethics programs on decision-making. Journal of Business Ethics, 27(1), 33-42.

O'Neill, O. (2000). Kantian Ethics. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Paine, L. (2000). Does ethics pay? Business Ethics Quarterly, 10(1), 319-330

Penn, W. (1990). Teaching ethics - A direct approach. Journal of Moral Education, 19(2), 124-138.

Plato. (1968). The Republic (A. Bloom, Trans.). New York, NY: Basic Books (Original work published 360 B.C.).

Polkinghorne, D. (1988). Narrative knowing and the human sciences. Albany, NY: State University of New York Press.

Presidential Commission on the Space Shuttle *Challenger* Accident. Report to the President by the Presidential Commission on the Space Shuttle Challenger Accident. Washington, D.C.: Government Printing Office, 1986.

Reason, J. (1990). Human error (1st ed.). New York, NY: Cambridge University Press.

Raytheon Ethics (2000, September) [On-line]. Available:  
<http://www.raytheon.com/ethics/>

Rest, J. (1979). Development in judging moral issues (1st ed.). Minneapolis, MN: University of Minnesota Press.

Rest, J., & Narvaez, D. (Eds.). (1994). Moral development in the professions. Hillsdale, NJ: Lawrence Erlbaum Associates.

Rest, J., Narvaez, D., Thoma, S., & Bebeau, M. (1998A). Minnesota's neo-Kohlbergian approach to morality research. Unpublished manuscript.

Rest, J., & Narvaez, D. (1998B). Guide for DIT-2. (Available from The Center for the Study of Ethical Development, University of Minnesota, 206-A Burton Hall, 178 Pillsbury Drive SE, Minneapolis, MN 55455).

Rest, J., Narvaez, D., Mitchell, C., & Thoma, S. (1999). Exploring moral judgment – A technical manual for the defining issues test. (Available from The Center for the Study of Ethical Development, University of Minnesota, 206-A Burton Hall, 178 Pillsbury Drive SE, Minneapolis, MN 55455).

Rest, J., Narvaez, D., Thoma, S., & Bebeau, M. (1999). DIT2: Devising and testing a revised instrument of moral judgment. Journal of Educational Psychology, *91*(4), 644-659.

Schiavo, M., & Chartrand, S. (1997). Flying blind, flying safe. New York, NY: Avon Books.

Schnebel, E., (2000). Values in decision-making processes: systematic structures of J. Habermas and N. Luhmann for the appreciation of responsibility in leadership. Journal of Business Ethics, *27*(1), 79-88.

Schofield, M. (2000). Applied ethics. In Concise Routledge encyclopedia of philosophy (p. 42). New York, NY: Routledge.

Schudt, K. (2000). Taming the corporate monster: An Aristotelian approach to corporate virtue. Business Ethics Quarterly, *10*(3), 711-723.

Sims, R., & Keon, T. (1999). Determinants of ethical decision making: The relationship of the perceived organizational environment. Journal of Business Ethics, *19*(4), 393-402.

Sims, R., & Keon, T. (2000). The influence of organizational expectations on ethical decision making conflict. Journal of Business Ethics, *23*(2), 219-229.

Simon, H. (1983). Reason in human affairs. London, UK: Basil Blackwell.

Singhapakdi, A., Vitell S., & Kraft, K. (1996). Moral intensity and ethical decision-making of marketing professionals. Journal of Business Research, 36(2), 245-255.

Street, D., Robertson, C., & Geiger, W. (1997). Ethical decision making: The effects of escalating commitment. Journal of Business Ethics, 16(11), 1153-1162.

Sudley, D. (2000). Ancient philosophy. Concise Routledge encyclopedia of philosophy (1st ed.). New York, NY: Routledge.

Sunstein, C., & Ullmann-Margalit, E. (1999). Second-order decisions. Ethics, 110(1), 5-30.

Tengrunsel, A., (1998). Misrepresentation and expectations of misrepresentation in an ethical dilemma: The role of incentives and temptation. Academy of Management Journal, 41(3), 330-340.

The Jet Propulsion Laboratory Ethics Program [Online]. Available: <http://www.jpl.nasa.gov/ethics/> [2000, September 1].

The University of Idaho [Online]. Available: [http://www.ets.uidaho.edu/center\\_for\\_ethics/hbvci.htm](http://www.ets.uidaho.edu/center_for_ethics/hbvci.htm) [2000, September 30].

Thoma, S., & Rest, J. (1999). The relationship between moral decision making and patterns of consolidation and transition in moral judgment development. Developmental Psychology, 35(2), 323-324.

Van Wart, M. (1996). The sources of ethical decision making for individuals in the public sector. Public Administration Review, 56(6), 525-532.

Vidaver-Cohen, D. (1998). Moral imagination in organizational problem-solving: an institutional perspective. Business Ethics Quarterly, December edition, 123-125.

Vaughan, D. (1996), The Challenger launch decision. Chicago, IL: The University of Chicago Press.

Walker, K. (1993). Values, ethics, and ethical decision-making. Adult Learning, 5(2), 13-16.

Wiersma, W. (1995). Research methods in education - An introduction (6th ed.). Needham Heights, MA: Allyn and Bacon (Original work published 1969).

Werhane, P. (1998). Moral imagination and the search for ethical decision-making in management. Business Ethics Quarterly, Special Issue #1, pp. 75-98.

Wijnberg, N. (2000). Normative stakeholder theory and Aristotle: The link between ethics and politics. Journal of Business Ethics, 25(4), 329-342.

Wueste, D. (1999). The realist's challenge in professional ethics: Taking some cues from legal philosophy. Professional Ethics, 7(2), 3-22.

APPENDIXES

APPENDIX A  
INSTITUTIONAL REVIEW BOARD  
APPROVAL FORM

Oklahoma State University  
Institutional Review Board

Protocol Expires: 6/16/01

Date: Friday, June 16, 2000

IRB Application No: ED00282

Proposal Title: A STUDY OF ETHICS IN THE AEROSPACE INDUSTRY

Principal  
Investigator(s):

Ned S. Reese  
900 Augusta Ave  
Edmond, OK 73034

Steven Marks  
308 Cordell North  
Stillwater, OK 74078

Reviewed and  
Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

---

1) Please change #12 to no and explain that by completing the questionnaire, respondents give consent. No actual consent for is being used.

Signature:

  
\_\_\_\_\_  
Carol Olson, Director of University Research Compliance

Friday, June 16, 2000

\_\_\_\_\_  
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

APPENDIX B

DEFINING ISSUES TEST – 1

## INSTRUCTION BOOKLET

---

---

**DIT**

**DEFINING ISSUES TEST**  
University of Minnesota  
Copyright, James Rest  
All Rights Reserved, 1979

---

**Opinions about Social Problems**

The purpose of this questionnaire is to help us understand how people think about social problems. Different people have different opinions about questions of right and wrong. There are no "right" answers to such problems in the way that math problems have right answers. We would like you to tell us what you think about several problem stories.

You will be asked to read a story from this booklet. Then you will be asked to mark your answers on a separate answer sheet. More details about how to do this will follow. But it is important that you fill in your answers on the answer sheet with a #2 pencil. Please make sure that your mark completely fills the little circle, that the mark is dark, and that any erasures that you make are completely clean.

The Identification Number at the top of the answer sheet may already be filled in when you receive your materials. If not, you will receive special instructions about how to fill in that number.

---

In this questionnaire you will be asked to read a story and then to place marks on the answer sheet. In order to illustrate how we would like you to do this, consider the following story:

**FRANK AND THE CAR**

Frank Jones has been thinking about buying a car. He is married, has two small children and earns an average income. The car he buys will be his family's only car. It will be used mostly to get to work and drive around town, but sometimes for vacation trips also. In trying to decide what car to buy, Frank Jones realized that there were a lot of questions to consider. For instance, should he buy a larger used car or a smaller new car for about the same amount of money? Other questions occur to him.

We note that this is not really a social problem, but it will illustrate our instructions. After you read a story you will then turn to the answer sheet to find the section that corresponds to the story. But in this sample story, we present the questions below (along with some sample answers). Note that all your answers will be marked on the separate answer sheet.

First, on the answer sheet for each story you will be asked to indicate your recommendation for what a person should do. If you tend to favor one action or another (even if you are not completely sure), indicate which one. If you do not favor either action, mark the circle by "can't decide."

Second, read each of the items numbered 1 to 12. Think of the issue that the item is raising. If that issue is important in making a decision, one way or the other, then mark the circle by "great." If that issue is not important or doesn't make sense to you, mark "no." If the issue is relevant but not critical, mark "much," "some," or "little" -- depending on how much importance that issue has in your opinion. You may mark several items as "great" (or any other level of importance) -- there is no fixed number of items that must be marked at any one level.

Third, after you have made your marks along the left hand side of each of the 12 items, then at the bottom you will be asked to choose the item that is the most important consideration out of all the items printed there. Pick from among the items provided even if you think that none of the items are of "great" importance. Of the items that are presented there, pick one as the most important (relative to the others), then the second most important, third, and fourth most important.

---

**SAMPLE ITEMS and SAMPLE ANSWERS:**

FRANK AND THE CAR: ● buy new car    0 can't decide    0 buy used car

Great    Some    No  
 Much    Little

- 
- 0 0 0 0 ● 1. Whether the car dealer was in the same block as where Frank lives.
- 0 0 0 0 2. Would a used car be more economical in the long run than a new car.
- 0 0 ● 0 0 3. Whether the color was green, Frank's favorite color.
- 0 0 0 0 ● 4. Whether the cubic inch displacement was at least 200.
- 0 0 0 0 5. Would a large, roomy car be better than a compact car.
- 0 0 0 0 ● 6. Whether the front connibilies were differential.

	1	2	3	4	5	6	7	8	9	10	11	12
Most important item	0	0	0	0	●	0	0	0	0	0	0	0
Second most important	0	●	0	0	0	0	0	0	0	0	0	0
Third most important	0	0	●	0	0	0	0	0	0	0	0	0
Fourth most important	●	0	0	0	0	0	0	0	0	0	0	0

---

Note that in our sample responses, the first item was considered irrelevant; the second item was considered as a critical issue in making a decision; the third item was considered of only moderate importance; the fourth item was not clear to the person responding whether 200 was good or not, so it was marked "no"; the fifth item was also of critical importance; and the sixth item didn't make any sense, so it was marked "no".

Note that the most important item comes from one of the items marked on the far left hand side. In deciding between item #2 and #5, a person should reread these items, then put one of them as the most important, and the other item as second, etc.

Here is the first story for your consideration. Read the story and then turn to the separate answer sheet to mark your responses. After filling in the four most important items for the story, return to this booklet to read the next story. Please remember to fill in the circle completely, make dark marks, and completely erase all corrections.

#### HEINZ AND THE DRUG

In Europe a woman was near death from a special kind of cancer. There was one drug that doctors thought might save her. It was a form of radium that a druggist in the same town had recently discovered. The drug was expensive to make, but the druggist was charging ten times what the drug cost to make. He paid \$200 for the radium and charged \$2,000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow the money, but he could only get together about \$1,000, which is half of what it cost. He told the druggist that his wife was dying, and asked him to sell it cheaper or let him pay later. But the druggist said, "No, I discovered the drug and I'm going to make money from it." So Heinz got desperate and began to think about breaking into the man's store to steal the drug for his wife. Should Heinz steal the drug?

#### ESCAPED PRISONER

A man had been sentenced to prison for 10 years. After one year, however, he escaped from prison, moved to a new area of the country, and took on the name of Thompson. For eight years he worked hard, and gradually he saved enough money to buy his own business. He was fair to his customers, gave his employees top wages, and gave most of his own profits to charity. Then one day, Mrs. Jones, an old neighbor, recognized him as the man who had escaped from prison eight years before, and whom the police had been looking for. Should Mrs. Jones report Mr. Thompson to the police and have him sent back to prison?

#### NEWSPAPER

Fred, a senior in high school, wanted to publish a mimeographed newspaper for students so that he could express many of his opinions. He wanted to speak out against the use of the military in international disputes and to speak out against some of the school's rules, like the rule forbidding boys to wear long hair.

When Fred started his newspaper, he asked his principal for permission. The principal said it would be all right if before every publication Fred would turn in all his articles for the principal's approval. Fred agreed and turned in several articles for approval. The principal approved all of them and Fred published two issues of the paper in the next two weeks.

But the principal had not expected that Fred's newspaper would receive so much attention. Students were so excited by the paper that they began to organize protests against the hair regulation and other school rules. Angry parents objected to Fred's opinions. They phoned the principal telling him that the newspaper was unpatriotic and should not be published. As a result of the rising excitement, the principal ordered Fred to stop publishing. He gave as a reason that Fred's activities were disruptive to the operation of the school. Should the principal stop the newspaper?

**DOCTOR'S DILEMMA**

A lady was dying of cancer which could not be cured and she had only about six months to live. She was in terrible pain, but she was so weak that a good dose of pain-killer like morphine would make her die sooner. She was delirious and almost crazy with pain, and in her calm periods, she would ask the doctor to give her enough morphine to kill her. She said she couldn't stand the pain and that she was going to die in a few months anyway. Should the doctor give her an overdose of morphine that would make her die?

**WEBSTER**

Mr. Webster was the owner and manager of a gas station. He wanted to hire another mechanic to help him, but good mechanics were hard to find. The only person he found who seemed to be a good mechanic was Mr. Lee, but he was Chinese. While Mr. Webster himself didn't have anything against Orientals, he was afraid to hire Mr. Lee because many of his customers didn't like Orientals. His customers might take their business elsewhere if Mr. Lee was working in the gas station.

When Mr. Lee asked Mr. Webster if he could have the job, Mr. Webster said that he had already hired somebody else. But Mr. Webster really had not hired anybody, because he could not find anybody who was a good mechanic besides Mr. Lee. Should Mr. Webster have hired Mr. Lee?

**STUDENT TAKE-OVER**

Back in the 1960s at Harvard University there was a student group called Students for a Democratic Society (SDS). SDS students were against the war in Viet Nam, and were against the army training program (ROTC) that helped to send men to fight in Viet Nam. While the war was still going on, the SDS students demanded that Harvard end the army ROTC program as a university course. This would mean that Harvard students could not get army training as part of their regular course work and not get credit for it towards their degree.

Harvard professors agreed with the SDS students. The professors voted to end the ROTC program as a university course. But the President of the University took a different view. He stated that the army program should stay on campus as a course.

The SDS students felt that the President of the University was not going to pay attention to the vote of the professors, and was going to keep the ROTC program as a course on campus. The SDS students then marched to the university's administration building and told everyone else to get out. They said they were taking over the building to force Harvard's President to get rid of the army ROTC program on campus for credit as a course.

Were the students right to take over the administration building?

Please make sure that all your marks are dark, fill the circles, and that all erasures are clean.

**THANK YOU.**





GREAT  
MUCH  
SOME  
LITTLE  
NO

NEWSPAPER:  Should stop it     Can't decide     Should not stop it

- 1. Is the principal more responsible to students or to parents?
- 2. Did the principal give his word that the newspaper could be published for a long time, or did he just promise to approve the newspaper one issue at a time?
- 3. Would the students start protesting even more if the principal stopped the newspaper?
- 4. When the welfare of the school is threatened, does the principal have the right to give orders to students?
- 5. Does the principal have the freedom of speech to say "no" in this case?
- 6. If the principal stopped the newspaper would he be preventing full discussion of important problems?
- 7. Whether the principal's order would make Fred lose faith in the principal.
- 8. Whether Fred was really loyal to his school and patriotic to his country.
- 9. What effect would stopping the paper have on the student's education in critical thinking and judgment?
- 10. Whether Fred was in any way violating the rights of others in publishing his own opinions.
- 11. Whether the principal should be influenced by some angry parents when it is the principal that knows best what is going on in the school.
- 12. Whether Fred was using the newspaper to stir up hatred and discontent.

- Most important item     1  2  3  4  5  6  7  8  9  10  11  12
- Second most important  1  2  3  4  5  6  7  8  9  10  11  12
- Third most important     1  2  3  4  5  6  7  8  9  10  11  12
- Fourth most important     1  2  3  4  5  6  7  8  9  10  11  12

GREAT  
MUCH  
SOME  
LITTLE  
NO

DOCTOR'S DILEMMA:  He should give the lady an overdose that will make her die     Can't decide     Should not give the overdose

- 1. Whether the woman's family is in favor of giving her the overdose or not.
- 2. Is the doctor obligated by the same laws as everybody else if giving an overdose would be the same as killing her.
- 3. Whether people would be much better off without society regimenting their lives and even their deaths.
- 4. Whether the doctor could make it appear like an accident.
- 5. Does the state have the right to force continued existence on those who don't want to live.
- 6. What is the value of death prior to society's perspective on personal values.
- 7. Whether the doctor has sympathy for the woman's suffering or cares more about what society might think.
- 8. Is helping to end another's life ever a responsible act of cooperation.
- 9. Whether only God should decide when a person's life should end.
- 10. What values the doctor has set for himself in his own personal code of behavior.
- 11. Can society afford to let everybody end their lives when they want to.
- 12. Can society allow suicides or mercy killing and still protect the lives of individuals who want to live.

- Most important item     1  2  3  4  5  6  7  8  9  10  11  12
- Second most important  1  2  3  4  5  6  7  8  9  10  11  12
- Third most important     1  2  3  4  5  6  7  8  9  10  11  12
- Fourth most important     1  2  3  4  5  6  7  8  9  10  11  12

PLEASE DO NOT WRITE IN THIS AREA



GREAT  
MUCH  
SOME  
LITTLE  
NO

WEBSTER:  Should have hired Mr. Lee     Can't decide     Should not have hired him

- 1. Does the owner of a business have the right to make his own business decisions or not?
- 2. Whether there is a law that forbids racial discrimination in hiring for jobs.
- 3. Whether Mr. Webster is prejudiced against orientals himself or whether he means nothing personal in refusing the job.
- 4. Whether hiring a good mechanic or paying attention to his customers' wishes would be best for his business.
- 5. What individual differences ought to be relevant in deciding how society's rules are filled?
- 6. Whether the greedy and competitive capitalistic system ought to be completely abandoned.
- 7. Do a majority of people in Mr. Webster's society feel like his customers or are a majority against prejudice?
- 8. Whether hiring capable men like Mr. Lee would use talents that would otherwise be lost to society.
- 9. Would refusing the job to Mr. Lee be consistent with Mr. Webster's own moral beliefs?
- 10. Could Mr. Webster be so hard-hearted as to refuse the job, knowing how much it means to Mr. Lee?
- 11. Whether the Christian commandment to love your fellow man applies to this case.
- 12. If someone's in need, shouldn't he be helped regardless of what you get back from him?

Most important item    1 2 3 4 5 6 7 8 9 10 11 12  
 Second most important    1 2 3 4 5 6 7 8 9 10 11 12  
 Third most important    1 2 3 4 5 6 7 8 9 10 11 12  
 Fourth most important    1 2 3 4 5 6 7 8 9 10 11 12

GREAT  
MUCH  
SOME  
LITTLE  
NO

STUDENTS:  Take it over     Can't decide     Not take it over

- 1. Are the students doing this to really help other people or are they doing it just for kicks.
- 2. Do the students have any right to take over property that doesn't belong to them.
- 3. Do the students realize that they might be arrested and fined, and even expelled from school.
- 4. Would taking over the building in the long run benefit more people to a greater extent.
- 5. Whether the president stayed within the limits of his authority in ignoring the faculty vote.
- 6. Will the takeover anger the public and give all students a bad name.
- 7. Is taking over a building consistent with principles of justice.
- 8. Would allowing one student take-over encourage many other student take-overs.
- 9. Did the president bring this misunderstanding on himself by being so unreasonable and uncooperative.
- 10. Whether running the university ought to be in the hands of a few administrators or in the hands of all the people.
- 11. Are the students following principles which they believe are above the law.
- 12. Whether or not university decisions ought to be respected by students.

Most important item    1 2 3 4 5 6 7 8 9 10 11 12  
 Second most important    1 2 3 4 5 6 7 8 9 10 11 12  
 Third most important    1 2 3 4 5 6 7 8 9 10 11 12  
 Fourth most important    1 2 3 4 5 6 7 8 9 10 11 12

**PLEASE DO NOT WRITE IN THIS AREA**

GREAT  
MUCH  
SOME  
LITTLE  
NO

DILEMMA #7:  Pro  Can't decide  Con

<input type="radio"/>	1.				
<input type="radio"/>	2.				
<input type="radio"/>	3.				
<input type="radio"/>	4.				
<input type="radio"/>	5.				
<input type="radio"/>	6.				
<input type="radio"/>	7.				
<input type="radio"/>	8.				
<input type="radio"/>	9.				
<input type="radio"/>	10.				
<input type="radio"/>	11.				
<input type="radio"/>	12.				

Most important item	<input type="radio"/>											
Second most important	<input type="radio"/>											
Third most important	<input type="radio"/>											
Fourth most important	<input type="radio"/>											

**DO NOT WRITE IN SHADED AREAS**

GREAT  
MUCH  
SOME  
LITTLE  
NO

DILEMMA #8:  Pro  Can't decide  Con

<input type="radio"/>	1.				
<input type="radio"/>	2.				
<input type="radio"/>	3.				
<input type="radio"/>	4.				
<input type="radio"/>	5.				
<input type="radio"/>	6.				
<input type="radio"/>	7.				
<input type="radio"/>	8.				
<input type="radio"/>	9.				
<input type="radio"/>	10.				
<input type="radio"/>	11.				
<input type="radio"/>	12.				

Most important item	<input type="radio"/>											
Second most important	<input type="radio"/>											
Third most important	<input type="radio"/>											
Fourth most important	<input type="radio"/>											

PLEASE DO NOT WRITE IN THIS BOX



726239

APPENDIX C

DEFINING ISSUES TEST – 2

# ***DIT-2***

Defining Issues Test

Version 3.0

---

*University of Minnesota*  
Center for Research in Ethical Development

Copyright, James Rest & Darcia Narvaez  
All Rights Reserved, 1998

## **Instructions**

This questionnaire is concerned with how you define the issues in a social problem. Several stories about social problems will be described. After each story, there will be a list of questions. The questions that follow each story represent different issues that might be raised by the problem. In other words, the questions/issues raise different ways of judging what is important in making a decision about the social problem. You will be asked to rate and rank the questions in terms of how important each one seems to you.

This questionnaire is in two parts: one part contains the **INSTRUCTIONS** (this part) and the stories presenting the social problems; the other part contains the questions (issues) and the **ANSWER SHEET** on which to write your responses.

Here is an example of the task:

### **Presidential Election**

Imagine that you are about to vote for a candidate for the Presidency of the United States. Imagine that before you vote, you are given several questions, and asked which issue is the most important to you in making up your mind about which candidate to vote for. In this example, 5 items are given. On a rating scale of 1 to 5 (1=Great, 2=Much, 3=Some, 4=Little, 5=No) please rate the importance of the item (issue) by filling in with a pencil one of the bubbles on the answer sheet by each item.

Assume that you thought that item #1 (below) was of great importance, item #2 had some importance, item #3 had no importance, item #4 had much importance, and item #5 had much importance. Then you would fill in the bubbles on the answer sheet as shown below.

1 2 3 4 5

G	M	S	L	N
r	u	o	i	o
e	c	m	t	
a	h	e	t	
t			l	
			e	

	Item #:					
<input checked="" type="radio"/>	0	0	0	0	0	1. Financially are you personally better off now than you were four years ago?
0	0	<input checked="" type="radio"/>	0	0	0	2. Does one candidate have a superior personal moral character?
0	0	0	0	0	<input checked="" type="radio"/>	3. Which candidate stands the tallest?
0	<input checked="" type="radio"/>	0	0	0	0	4. Which candidate would make the best world leader?
0	<input checked="" type="radio"/>	0	0	0	0	5. Which candidate has the best ideas for our country's internal problems, like crime and health care?

Further, the questionnaire will ask you to rank the questions in terms of importance. In the space below, the numbers at the top, 1 through 12, represent the item number. From top to bottom, you are asked to fill in the bubble that represents the item in first importance (of those given you to chose from), then second most important, third most important, and fourth most important. Please indicate your top four choices. You might fill out this part, as follows:

Item number:	1	2	3	4	5	6	7	8	9	10	11	12
Most important item	<input checked="" type="radio"/>	0	0	0	0	0	0	0	0	0	0	0
Second most important	0	0	0	0	<input checked="" type="radio"/>	0	0	0	0	0	0	0
Third most important	0	0	0	<input checked="" type="radio"/>	0	0	0	0	0	0	0	0
Fourth most important	0	<input checked="" type="radio"/>	0	0	0	0	0	0	0	0	0	0

Note that some of the items may seem irrelevant to you (as in item #3) or not make sense to you--in that case, **rate** the item as "No" importance and do not **rank** the item. Note that in the stories that follow, there will be 12 items for each story, not five. Please make sure to consider all 12 items (questions) that are printed after each story.

In addition you will be asked to state your preference for what action to take in the story. After the story, you will be asked to indicate the action you favor on a seven-point scale (1=strongly favor some action, 7=strongly oppose that action).

In short, read the story from this booklet, then fill out your answers on the answer sheet. Please use a #2 pencil. If you change your mind about a response, erase the pencil mark cleanly and enter your new response.

*[Notice the second part of this questionnaire, the Answer Sheet. The Identification Number at the top of the answer sheet may already be filled in when you receive your materials. If not, you will receive instructions about how to fill in the number. If you have questions about the procedure, please ask now.]*

*Please turn now to the Answer Sheet.]*

---

**Famine --(Story #1)**

The small village in northern India has experienced shortages of food before, but this year's famine is worse than ever. Some families are even trying to feed themselves by making soup from tree bark. Mustaq Singh's family is near starvation. He has heard that a rich man in his village has supplies of food stored away and is hoarding food while its price goes higher so that he can sell the food later at a huge profit. Mustaq is desperate and thinks about stealing some food from the rich man's warehouse. The small amount of food that he needs for his family probably wouldn't even be missed.

*[If at any time you would like to reread a story or the instructions, feel free to do so. Now turn to the Answer Sheet, go to the 12 issues and rate and rank them in terms of how important each issue seems to you.]*

---

**Reporter --(Story #2)**

Molly Dayton has been a news reporter for the *Gazette* newspaper for over a decade. Almost by accident, she learned that one of the candidates for Lieutenant Governor for her state, Grover Thompson, had been arrested for shop-lifting 20 years earlier. Reporter Dayton found out that early in his life, Candidate Thompson had undergone a confused period and done things he later regretted, actions which would be very out-of-character now. His shop-lifting had been a minor offense and charges had been dropped by the department store. Thompson has not only straightened himself out since then, but built a distinguished record in helping many people and in leading constructive community projects. Now, Reporter Dayton regards Thompson as the best candidate in the field and likely to go on to important leadership positions in the state. Reporter Dayton wonders whether or not she should write the story about Thompson's earlier troubles because in the upcoming close and heated election, she fears that such a news story could wreck Thompson's chance to win.

*[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]*

---

**School Board --(Story #3)**

Mr. Grant has been elected to the School Board District 190 and was chosen to be Chairman. The district is bitterly divided over the closing of one of the high schools. One of the high schools has to be closed for financial reasons, but there is no agreement over which school to close. During his election to the School Board, Mr. Grant had proposed a series of "Open Meetings" in which members of the community could voice their opinions. He hoped that dialogue would make the community realize the necessity of closing one high school. Also he hoped that through open discussion, the difficulty of the decision would be appreciated, and that the community would ultimately support the school board decision. The first Open Meeting was a disaster. Passionate speeches dominated the microphones and threatened violence. The meeting barely closed without fist-fights. Later in the week, school board members received threatening phone calls. Mr. Grant wonders if he ought to call off the next Open Meeting.

*[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]*

---

**Cancer --(Story #4)**

Mrs. Bennett is 62 years old, and in the last phases of colon cancer. She is in terrible pain and asks the doctor to give her more pain-killer medicine. The doctor has given her the maximum safe dose already and is reluctant to increase the dosage because it would probably hasten her death. In a clear and rational mental state, Mrs. Bennett says that she realizes this, but she wants to end her suffering even if it means ending her life. Should the doctor give her an increased dosage?

*[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]*

---

**Demonstration --(Story #5)**

Political and economic instability in a South American country prompted the President of the United States to send troops to "police" the area. Students at many campuses in the U.S.A. have protested that the United States is using its military might for economic advantage. There is widespread suspicion that big oil multinational companies are pressuring the President to safeguard a cheap oil supply even if it means loss of life. Students at one campus took to the streets in demonstrations, tying up traffic and stopping regular business in the town. The president of the university demanded that the students stop their illegal demonstrations. Students then took over the college's administration building, completely paralyzing the college. Are the students right to demonstrate in these ways?

*[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]*



**School Board -- (Story #3)**

*Do you favor calling off the next Open Meeting?*

Call off meeting ① Strongly Favor ② Favor ③ Slightly Favor ④ Neutral ⑤ Slightly Disfavor ⑥ Disfavor ⑦ Strongly Disfavor

GREAT  
MUCH  
SOME  
LITTLE  
NO

**Rate the following 12 issues in terms of importance (1-5)**

- ① ② ③ ④ ⑤ 1. Is Mr. Grant required by law to have Open Meetings on major school board decisions?
- ① ② ③ ④ ⑤ 2. Would Mr. Grant be breaking his election campaign promises to the community by discontinuing the Open Meetings?
- ① ② ③ ④ ⑤ 3. Would the community be even angrier with Mr. Grant if he stopped the Open Meetings?
- ① ② ③ ④ ⑤ 4. Would the change in plans prevent scientific assessment?
- ① ② ③ ④ ⑤ 5. If the school board is threatened, does the chairman have the legal authority to protect the Board by making decisions in closed meetings?
- ① ② ③ ④ ⑤ 6. Would the community regard Mr. Grant as a coward if he stopped the open meetings?
- ① ② ③ ④ ⑤ 7. Does Mr. Grant have another procedure in mind for ensuring that divergent views are heard?
- ① ② ③ ④ ⑤ 8. Does Mr. Grant have the authority to expel troublemakers from the meetings or prevent them from making long speeches?
- ① ② ③ ④ ⑤ 9. Are some people deliberately undermining the school board process by playing some sort of power game?
- ① ② ③ ④ ⑤ 10. What effect would stopping the discussion have on the community's ability to handle controversial issues in the future?
- ① ② ③ ④ ⑤ 11. Is the trouble coming from only a few hotheads, and is the community in general really fair-minded and democratic?
- ① ② ③ ④ ⑤ 12. What is the likelihood that a good decision could be made without open discussion from the community?

*Rank which issue is the most important (item number).*

Most important item ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ Third most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫  
 Second most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ Fourth most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

*Now please return to the Instructions booklet for the next story.*

**Cancer -- (Story #4)**

*Do you favor the action of giving more medicine?*

Give more medicine ① Strongly Favor ② Favor ③ Slightly Favor ④ Neutral ⑤ Slightly Disfavor ⑥ Disfavor ⑦ Strongly Disfavor

GREAT  
MUCH  
SOME  
LITTLE  
NO

**Rate the following 12 issues in terms of importance (1-5)**

- ① ② ③ ④ ⑤ 1. Isn't the doctor obligated by the same laws as everybody else if giving an overdose would be the same as killing her?
- ① ② ③ ④ ⑤ 2. Wouldn't society be better off without so many laws about what doctors can and cannot do?
- ① ② ③ ④ ⑤ 3. If Mrs. Bennett dies, would the doctor be legally responsible for malpractice?
- ① ② ③ ④ ⑤ 4. Does the family of Mrs. Bennett agree that she should get more painkiller medicine?
- ① ② ③ ④ ⑤ 5. Is the painkiller medicine an active hallucinogenic drug?
- ① ② ③ ④ ⑤ 6. Does the state have the right to force continued existence on those who don't want to live?
- ① ② ③ ④ ⑤ 7. Is helping to end another's life ever a responsible act of cooperation?
- ① ② ③ ④ ⑤ 8. Would the doctor show more sympathy for Mrs. Bennett by giving the medicine or not?
- ① ② ③ ④ ⑤ 9. Wouldn't the doctor feel guilty from giving Mrs. Bennett so much drug that she died?
- ① ② ③ ④ ⑤ 10. Should only God decide when a person's life should end?
- ① ② ③ ④ ⑤ 11. Shouldn't society protect everyone against being killed?
- ① ② ③ ④ ⑤ 12. Where should society draw the line between protecting life and allowing someone to die if the person wants to?

*Rank which issue is the most important (item number).*

Most important item ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ Third most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫  
 Second most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ Fourth most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

*Now please return to the Instructions booklet for the next story.*

PLEASE DO NOT WRITE IN THIS AREA

**Demonstration -- (Story #5)**

*Do you favor the action of demonstrating in this way?*

Students demonstrate ① Strongly Favor ② Favor ③ Slightly Favor ④ Neutral ⑤ Slightly Disfavor ⑥ Disfavor ⑦ Strongly Disfavor

GREAT  
MUCH  
SOME  
LITTLE  
NO

*Rate the following 12 issues in terms of importance (1-5)*

- ① ② ③ ④ ⑤ 1. Do the students have any right to take over property that doesn't belong to them?
- ① ② ③ ④ ⑤ 2. Do the students realize that they might be arrested and fined, and even expelled from school?
- ① ② ③ ④ ⑤ 3. Are the students serious about their cause or are they doing it just for fun?
- ① ② ③ ④ ⑤ 4. If the university president is soft on students this time, will it lead to more disorder?
- ① ② ③ ④ ⑤ 5. Will the public blame all students for the actions of a few student demonstrators?
- ① ② ③ ④ ⑤ 6. Are the authorities to blame by giving in to the greed of the multinational oil companies?
- ① ② ③ ④ ⑤ 7. Why should a few people like Presidents and business leaders have more power than ordinary people?
- ① ② ③ ④ ⑤ 8. Does this student demonstration bring about more or less good in the long run to all people?
- ① ② ③ ④ ⑤ 9. Can the students justify their civil disobedience?
- ① ② ③ ④ ⑤ 10. Shouldn't the authorities be respected by students?
- ① ② ③ ④ ⑤ 11. Is taking over a building consistent with principles of justice?
- ① ② ③ ④ ⑤ 12. Isn't it everyone's duty to obey the law, whether one likes it or not?

*Rank which issue is the most important (item number).*

Most important item ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ Third most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫  
 Second most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ Fourth most important ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

*Please provide the following information about yourself:*

- 1. Age in years:
 

⑥	⑥
①	①
②	②
③	③
④	④
⑤	⑤
⑥	⑥
⑦	⑦
⑧	⑧
⑨	⑨
- 2. Sex (mark one):  Male  Female
- 3. Level of Education (mark highest level of formal education attained, if you are currently working at that level [e.g., Freshman in college] or if you have completed that level [e.g., if you finished your Freshman year but have gone on no further].)
  - Grade 1 to 6
  - Grade 7, 8, 9
  - Grade 10, 11, 12
  - Vocational/technical school (without a bachelor's degree) (e.g., Auto mechanic, beauty school, real estate, secretary, 2-year nursing program).
  - Junior college (e.g., 2-year college, community college, Associate Arts degree)
  - Freshman in college in bachelor degree program.
  - Sophomore in college in bachelor degree program.
  - Junior in college in bachelor degree program.
  - Senior in college in bachelor degree program.
  - Professional degree (Practitioner degree beyond bachelor's degree) (e.g., M.D., M.B.A., Bachelor of Divinity, D.D.S. in Dentistry, J.D. in law, Masters of Arts in teaching, Masters of Education [in teaching], Doctor of Psychology, Nursing degree along with 4-year Bachelor's degree)
  - Masters degree (in academic graduate school)
  - Doctoral degree (in academic graduate school, e.g., Ph.D. or Ed.D.)
  - Other Formal Education. (Please describe: \_\_\_\_\_)
- 4. In terms of your political views, how would you characterize yourself (mark one)?
  - Very Liberal
  - Somewhat Liberal
  - Neither Liberal nor Conservative
  - Somewhat Conservative
  - Very Conservative
- 5. Are you a citizen of the U.S.A.?
  - Yes  No
- 6. Is English your primary language?
  - Yes  No

**Thank You.**

PLEASE DO NOT WRITE IN THIS AREA

**Dilemma #6**

*Do you favor the action?*

- ① Strongly Favor   ② Favor   ③ Slightly Favor   ④ Neutral   ⑤ Slightly Disfavor   ⑥ Disfavor   ⑦ Strongly Disfavor

GREAT  
MUCH  
SOME  
LITTLE  
NO

*Rate the following 12 issues in terms of importance (1-5)*

① ② ③ ④ ⑤ 1. \_\_\_\_\_

① ② ③ ④ ⑤ 2. \_\_\_\_\_

① ② ③ ④ ⑤ 3. \_\_\_\_\_

① ② ③ ④ ⑤ 4. \_\_\_\_\_

① ② ③ ④ ⑤ 5. \_\_\_\_\_

① ② ③ ④ ⑤ 6. \_\_\_\_\_

① ② ③ ④ ⑤ 7. \_\_\_\_\_

① ② ③ ④ ⑤ 8. \_\_\_\_\_

① ② ③ ④ ⑤ 9. \_\_\_\_\_

① ② ③ ④ ⑤ 10. \_\_\_\_\_

① ② ③ ④ ⑤ 11. \_\_\_\_\_

① ② ③ ④ ⑤ 12. \_\_\_\_\_

*Rank which issue is the most important (item number).*

Most important item   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Third most important   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Second most important   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Fourth most important   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

**Dilemma #7**

*Do you favor the action?*

- ① Strongly Favor   ② Favor   ③ Slightly Favor   ④ Neutral   ⑤ Slightly Disfavor   ⑥ Disfavor   ⑦ Strongly Disfavor

GREAT  
MUCH  
SOME  
LITTLE  
NO

*Rate the following 12 issues in terms of importance (1-5)*

① ② ③ ④ ⑤ 1. \_\_\_\_\_

① ② ③ ④ ⑤ 2. \_\_\_\_\_

① ② ③ ④ ⑤ 3. \_\_\_\_\_

① ② ③ ④ ⑤ 4. \_\_\_\_\_

① ② ③ ④ ⑤ 5. \_\_\_\_\_

① ② ③ ④ ⑤ 6. \_\_\_\_\_

① ② ③ ④ ⑤ 7. \_\_\_\_\_

① ② ③ ④ ⑤ 8. \_\_\_\_\_

① ② ③ ④ ⑤ 9. \_\_\_\_\_

① ② ③ ④ ⑤ 10. \_\_\_\_\_

① ② ③ ④ ⑤ 11. \_\_\_\_\_

① ② ③ ④ ⑤ 12. \_\_\_\_\_

*Rank which issue is the most important (item number).*

Most important item   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Third most important   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Second most important   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

Fourth most important   ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

PLEASE DO NOT WRITE IN THIS AREA



12016

APPENDIX D

DEFINING ISSUES TEST VALIDITY  
AND RELIABILITY

## D1

## DIT Reliability and Validity Issues

The DIT is a paper-and-pencil measure of moral judgment derived from Kohlberg's theory (Kohlberg, 1986). Instead of scoring free-responses to hypothetical moral dilemmas in an interview (e.g., Kohlberg's Moral Judgment Interview), the DIT presents 12 issues after a hypothetical dilemma for a subject to rate and rank in terms of their importance. Hence the DIT data consists of ratings and rankings instead of interview responses that are then scored by a trained judge according to a scoring manual. Instead of envisioning the scoring process as classifying responses into Kohlberg's 6 stages, the DIT analyzes responses as activating three schemas. The scores represent the degree to which a subject uses the Personal Interest, Maintaining Norms, or Postconventional Schema. The schemas have a close relation to Kohlberg's stages, yet they are different. As with Kohlberg's theory, the schema scores purport to measure developmental adequacy—in particular, how people conceptualize how it is possible to organize cooperation in a society. In short, the DIT is a measure of the development of concepts of social justice.

Validity for the DIT has been assessed in terms of 7 criteria.

1. Differentiation of various age/education groups – studies show that 30% to 50% of the variance of DIT scores is attributable to level of education.
2. Longitudinal gains – a 10-year longitudinal study of men and women, of college-attendees and non-college subjects from diverse walks of life show gains; a review of a dozen studies of Freshman to Senior college students (N>500) show effect sizes of .80, making gains in DIT scores one of the most dramatic effects of college.
3. The DIT is significantly related to cognitive capacity measures of Moral Comprehension ( $r=.60s$ ), recall and reconstruction of Postconventional moral arguments, Kohlberg's interview measure, and (to a lesser degree) to other cognitive developmental measures.
4. The DIT is sensitive to moral education interventions. One review of over 50 intervention studies reports an Effect Size for dilemma discussion interventions to be .41 (“moderate” gains) whereas the Effect Size for comparison groups was only .09 (“little” gain).
5. The DIT is significantly linked to many “prosocial” behaviors and to desired professional decision making. One review reports that 37 out of 47 correlations were statistically significant.
6. The DIT is significantly linked to political attitudes and political choices – in a review of several dozen correlates of political attitude, the DIT typically correlates in the range,  $r=.40$  to  $.65$ . When coupled with measures of cultural ideology, the combination predicts up to 2/3s of the variance of controversial public policy issues (such as abortion, religion in the public school, women's roles, rights of the accused, rights of homosexuals, free speech issues).

7. Reliability is adequate. Cronbach alpha is in the upper .70s / low .80s. Test-retest reliability is about the same. Further, the DIT shows discriminant validity from verbal ability/general intelligence and from Conservative/Liberal Political attitudes – that is, the information in a DIT score predicts to the 7 validity criteria above and beyond that accounted for by verbal ability or political attitude. The DIT is equally valid for males and females. No other variable or other construct predicts the pattern of results of the 7 validity criteria as well as moral judgment.

DIT-2 is an updated version of the original DIT devised 25 years ago. Compared to the original DIT, DIT-2 has updated stories and is also a shorter test, has clearer instructions, retains more subjects through subject reliability checks, and in studies so far, does not sacrifice validity. If anything it improves on validity. The correlation of DIT-1 with DIT-2 is .79, nearly the test-retest reliability of DIT-1 with itself. However when the new index (N2), and the new subject reliability checks (New Checks) are applied to DIT-1, the older and longer DIT1 shows the same validity as DIT-2.

Note. From Guide for DIT-2 (p.26-27), by James Rest, and Darcia Narvaez , 1998. Place of publication: Center for the Study of Ethical Development, University of Minnesota. Copyright 1998 by James Rest. Adapted with Permission.

APPENDIX E  
SOLICITATION LETTER

---

RESEARCH STUDY ON DECISION-MAKING IN THE AEROSPACE INDUSTRY

---

TO: RESPONDENT  
FROM: NED S. REESE  
SUBJECT: SOLICITATION FOR PARTICIPATION IN DECISION-MAKING ETHICS STUDY  
DATE: AUGUST 12, 2000

---

I am a doctoral candidate in the *College of Education, Department of Educational Studies* at *Oklahoma State University*, and am currently conducting a descriptive research study on decision-making ethics within the aerospace industry. The ultimate objective of this study is to develop a graduate level course in decision-making ethics for aerospace students. A critical element in this process is to determine the extent that issues of 'safety' affect decisions within the industry. Your position has been identified as one that has a certain degree of autonomy within your business and is responsible for decisions that can have significant impact on products, services, and people. Consequently, you have been selected as a *survey candidate* for the attached questionnaire.

The Defining Issues Questionnaire (DIT-2) is attached for your consideration. The DIT questionnaire has been used over the last 25 years in more than 400 studies of the moral judgment and moral development of numerous groups and organizations. It has also been helpful in identifying the various mental models that manifest during decision-making activity. A subject's performance on this test is not a measure of the morality of the person. Rather, it is a reflection of the basic conceptual framework by which an individual analyzes a social-moral dilemma and judges a proper course of action. Therefore, the value of this part of the study is not in the individual scores, but in the aggregate of scores provided by the entire population surveyed. Once completed the results will be compared with the findings of other studies of groups to determine the level of correlation. The number on the questionnaire is a code designed to **only** reflect the segment of the industry (operations, manufacturing, or regulatory) the respondent works within. The individual data sheets will not reflect any names, positions, or company with respect to the respondent and the survey analysis will only reflect aggregate data.

Your response to the DIT-2 questionnaire is very important to the success of this study. The survey consists of 5 stories that reflect social-moral dilemmas. The respondent is asked to respond via a Likert scale to three separate components of each story. The survey is designed to take approximately 35-45 minutes to complete. Participation in this study is strictly voluntary; however, if you decide to participate I would appreciate you completing and returning the questionnaire by August 25, 2000, in the enclosed, postage paid envelope. Completing and returning this survey implies you consent to participate in this research study and for your data to be used as described above.

Sincerely yours,



Ned S. Reese

Attachments

APPENDIX F

DIT2 ADMINISTRATIVE MATERIALS



F2

Principal Distribution Agent	Industry Segment			
	AeroCenter	Regulatory	Manufacturing	Operations
Self	26			
FAA Associate Administrator		25		
NTSB Chief of Staff		5		
Boeing Systems Manager			10	
NASA/JPL Ethics Officer				5
Bombardier Executive			5	
USAF Major (AWACS)				10
<b>Total =</b>	26	30	15	15

Industry Segment	DIT-2 Forms Series		Allocated	Distributed	Remaining
AeroCenter	11101	11126	26	26	0
Regulatory	22201	22230	30	30	0
Manufacturing	33301	33325	25	15	10
Operations	44401	44426	26	15	11
	<b>Total =</b>		107	86	21

APPENDIX G

CENTER FOR THE STUDY OF ETHICAL  
DEVELOPMENT – COMPILATION  
OF RAW DATA

**CENTER for the study of  
ETHICAL DEVELOPMENT***University of Minnesota*

---

Darcia Narvaez, Executive Director / 206 Burton Hall / 178 Pillsbury Drive SE / Minneapolis, MN 55455 / (612) 624-0876 / FAX: (612) 624-8241  
Steve Thoma, Research Director / 206 Burton Hall / 178 Pillsbury Drive SE / Minneapolis, MN 55455 / (612) 624-0876 / FAX: (612) 624-8241  
Muriel Bebeau, Education Director / 15-136 Moos Tower / Health Ecology / 515 Delaware Street SE / Minneapolis, MN 55455 / (612) 625-4633

Wednesday, September 20, 2000

Account Number: 6917

Mr. Ned Reese  
900 Augusta Ave.  
Edmond, OK 73034

Dear Mr. Reese:

Enclosed you will find a report on the DIT data that you sent to the Center.

**Statistical Analysis and Sub-groups**

The statistical analysis at the back of the Report should be regarded as preliminary and approximate since the programs do not carry out the calculations to the decimal places that commercial statistical packages use. Note that the sub-group analysis uses the first digit of the 5-digit ID number to form sub-groups. If your identification numbering system did not use the first digit of the ID number to form meaningful subgroups, then this part of the analysis is not meaningful.

**Additional Runs**

Also please note that the price charged for the DITs in the original order is based on the assumption that you send all your data to be scored at one time. Each time we perform a computer run, it involves a certain amount of set-up time. Therefore if you wish to send us data at different times in multiple waves (or if you send us data that you ask us to run in separate groups, not as one group), we must charge \$25 for set up time. If more than one computer set up is required on an account number, there will be an additional charge called "Additional Runs."

**Missing data (blanks)**

In looking over the printout of your raw data, you may find blanks in the listings. This indicates that the subject did not respond to that item on the questionnaire, or that the mark was too light for the scanner to read, or that the subject marked more than one response on that item. Some missing data is no cause for alarm since the program adjusts for missing data and calculates values as if the subject had not missed any data. If, however, entire stories and large blocks of data are missing, then the Subject Reliability checks (see "Consistency Check") will declare that protocol unreliable or substitute "99.9" (a missing value indicator) into the scores.

### Rescoring

If you consider that too much data is missing you may consider doing the following:

(1) Write to us to send back to you all of your original answer sheets. We store the answer sheets for three months before discarding them. (2) Upon receiving the original sheets, use the printout of raw data (part of the Report to you) to locate the questionnaires with missing data. The location of variables is given in the GUIDE, Table 2.1. (3) Resubmit the questionnaires to the subjects to fill in missing data, or darken the marks that may have been too faint for the optical scanner to read. (4) Return to us the revised questionnaires for us to process again (do not include those that were scanned and scored properly). The charge for rescoring questionnaires is \$.65 per questionnaire plus \$15 for set up costs for each separate batch. We then will re-run the questionnaires and send back to you a report on those data.

### Reinstating Purged subjects

You may be disappointed in the number of subjects that were purged by the various Reliability Checks (discussed in the GUIDE). Many studies lose 15% of their sample due to inconsistencies between ratings and rankings (a check for random checking), for endorsement of too many "Meaningless" items (a check for posturing), for leaving too much data out, for not discriminating among items, etc. These checks are derived on empirical grounds, not theoretical grounds. In the past, studies have shown larger expected trends with the checks than without them. However the assumptions about the proper cut-off values may not always be correct. We are currently reinvestigating our cut-off points --we may have been too stringent. In any case, in the Report, you are provided with the scores of every subject that was run without purging anybody (in the "Scored" file on the floppy disk, and listed on the paper copy on the page entitled, "Rest-Davison Scoring System"). The purged sample is used in the brief statistical analysis in the report. However, if you have reason to think that any subject who was purged really gave reliable information, you can reinstate that subject by getting the subject's scores from the "Scored" file (and add the data to the "Purged" sample). In fact, I think it is a good idea to analyze your results several ways: (1) use all the subjects (all subjects in the "Scored" file); (2) use only the subjects that survive our reliability checks (the "Purged" sample); and (3) use a sample in-between these two that includes some of the subjects who were eliminated by our checks but whom you have reason to believe gave good data. Acknowledge in your write-up of results that you used several different methods for composing your sample. I would be interested in your comparisons using different samples.

In any case, please send me a copy of your write-up. We are building a library of studies using the DIT. Thanks for your interest in DIT research.

Sincerely,

Darcia Narvaez



## CENTER for the study of ETHICAL DEVELOPMENT

*University of Minnesota*

---

Report on DIT data analysis to:

Mr. Ned Reese  
900 Augusta Ave.  
Edmond, OK 73034

20-Sep-00		
Account Number:	6917	
Date of original order:	5/3/00	
Original # DITs ordered:	0	
Date of First Scoring:	5/3/00	
Cumulative # DITs scored:	97	
Additional Runs:	1	
Litho Numbers:	11892 -	12017
	0 -	0

Listing of Raw DIT Data  
See Layout of variable locations in GUIDE

111010011918643253315355307030212	754522143455506050408	722152433323503010205	01
111010011918313134555512410021106	623243444525212101101	50 1 11 2 1 1	02
111020011919231252111554202060708	755551153514505061008	355552514234107120509	01
11102001191921532552221111121001	645225254225303060910	48 1 11 4 1 1	02
111030011920454353455553112110305	325555345521311011003	655254544332303111209	01
111030011920134455145553106120111	445455453223309100812	40 1 10 2 1 1	02
111040011921323353321242208111207	214352233212210010906	513322532423201050410	01
111040011921224125244534103120604	225433442342311010812	51 2 11 4 1 1	02
111050011922243354412321112011108	34452143513310060501	614454413422201071012	01
111050011922133245223352101070611	33544352332308110212	55 2 09 2 1 1	02
111060011923632152212125203070902	725231445423405100103	744231233122105120903	01
111060011923615154322124112010309	752424524525112040207	35 1 06 4 1 1	02
111070011924244253423453407030508	635552135425406051003	632323525525310020407	01
111070011924725255345512510011103	655535353314112100409	43 2 11 2 1 1	02
111080011925221251134543302050603	635522134334406050410	344413523441111120407	01
111080011925711443315511210011107	614535414431112011107	57 1 11 4 1 1	02
111090011926753152525245403050907	645552243512210061211	752525555535212041002	01
111090011926 32355125552112060211	215535352223112020908	56 1 09 5 1 1	02
111100011927322351334545307120211	623211334312206111202	75 255354213412071011	01
111100011927615555355111310110107	52132123535308050302	57 2 11 2 1 1	02
111110011928641234525455112020705	714521143542405011106	612233524521301040507	01
111110011928612123223112401030812	614212252332112010611	57 1 09 2 1 1	02
111120011929741133322444302030708	52332234443305040103	113243312332407011108	01
111120011929223324343313210100412	742333323414112100207	75 1 11 4 1 1	02
1111500119327212151115551 1005	1115511155311 0207	711535315313501021112	01
111150011932115413143414101040612	121112355321	47 1 10 3 1 1	02
111170011934623141114555307031205	253121533522301051112	751152251315402081012	01
1111700119341225 522423206110212	753132222435207120601	55 1 13 4 1 1	02
111190011936 1234332333205040702	32223343222404050201	32222333444305070602	01
111190011936 3323232424302060108	2344432233204020205	38 1 12 3 1 1	02
11121001193853225223542411020703	234331143343406050308	412431534323101120510	01
11121001193851312443322201031012	613123442443201030812	40 1 11 4 1 1	02
1112200119394555555155415110710	35445 155555060203	355152515545207031205	01
1112200119391543451 5455106120304	45554 55 45550904	39 2 11 2 1 1	02
111230011940653352524553307051211	745551245554405060711	711334542212102120101	01
111230011940315335424524301071012	714331553135501090508	44 2 12 4 1 1	02
111240011941 32242433535302070311	22245133434201061103	23232443455202100104	01
111240011941 24152432412410010612	53333425525209040311	45 1 11 2 1 1	02
111250011942651155515555507020308	75555115555506050801	75155555555502071210	01
11125001194271555555511510110109	71555555515112011008	56 1 11 5 1 1	02
111260011993241353212353302070608	335551234522306051011	734554313422207101211	01
111260011993144535122455212080706	713434454323301101112	49 1 11 3 1 1	02
222020011908643152313441203071112	114454324521201110712	622343523423210120201	01
222020011908234224314353112070403	23234354332411010309	47 1 10 2 1 1	02
222030011909232353413445207120502	755551155523505061001	323353424322207121009	01
222030011909124325223443112070604	13454522232407090806	2 11 2 1 1	02
22209001191535435332555507060305	733552134533206051211	7333545334242101207	01
222090011915235435325353207121104	232345352235409100210	46 1 12 2 1 1	02
222160011898 53153313555501070608	15551135 33301100501	11551553113112010910	01
222160011898 13115133153301060304	13535551131112011108	53 1 12 4 1 1	02
22219001190175415554555503061012	225551525552401050711	755552555515501050803	01
22219001190175455554515510020806	715515555511112011004	50 1 07 4 1 1	02
222200011902421253122344306020503	224452314532101120510	622343423333202100107	01
222200011902624345234412112010603	713324444223112010311	49 1 12 3 1 1	02

222210011897242342222355402051207	752451152555506020508	651132353425302100308	01
222210011897345355552221211120903	423233553324311030201	52 1 12 3 1 1	02
222220011896554223334554404030705	224453225522306010710	652344422314112100207	01
222220011896243545223555212060702	542334452424308100203	53 1 11 2 1 1	02
222230011894312253313332201070312	334251124522205061210	612251321212210121001	01
222230011894222125233232102061209	331232352122102091112	46 2 10 2 1 1	02
22224001189553352534544505070302	725451224553305060207	643155415323207031210	01
2222400118951 5155423455112030708	623555554223112011009	59 1 11 4 1 1	02
222300011998331355132153305101202	751351555553505110203	7311333131213203100702	01
222300011998214233322133303080409	652323334333301100203	48 1 10 3 1 1	02
333020011944542154233555503020607	434351434 42305110302	214344422243301050708	01
33302001194441415 452222301031206	754312444525101120911	40 1 08 4 1 1	02
333030011945744132424444201070312	744411443344405101110	644451511341212080501	01
333030011945144515221511104111203	744344444414112010608	56 1 11 4 1 1	02
333050011947352 535 35021105	255543 5 52112110106	2 425 52 54307021211	01
333050011947415 01	7155 20112	58 1 05 4 1 1	02
333140011956 222322432334 06	234423334222	123424333343	01
333140011956 132233243432	332234522232	51 1 11 4 1 1	02
333160011958633233245555512110702	753411552555501020306	752122241323410021203	01
333160011958715134235112201020308	751222454315201060507	52 1 12 4 1 1	02
333170011959252131242354308020611	751351144534505060107	514241511532201030502	01
333170011959415115125213110010312	334144343133209061211	30 1 09 2 1 1	02
333180011960733121411454305030708	324542124442306050111	632342423322302071005	01
333180011960211214213311110041207	712334354421112110110	48 1 12 5 1 1	02
333210011963111353122243302061203	634221134542405061110	542334423312210021207	01
333210011963624444414441201071201	624244242234303060809	52 1 09 4 1 1	02
333250011967 52254354555302030612	34452445553305011211	31245522223502071009	01
333250011967 15345423452201120711	23235552244408090103	57 1 09 4 1 1	02
444020011969641351514551105111202	615551114411101050611	422421512512107101205	01
444020011969225231115532106120705	223555552552112080111	38 2 10 2 1 1	02
444050011972741251311121108050711	753231114514201101207	714151412212101070512	01
444050011972112125211132101120608	225434421252108120201	64 1 09 2 1 1	02
444110011978341131222332207080203	614441244423106010512	242441532533205120802	01
444110011978114155124222112060301	723335252354112010608	42 1 11 3 1 1	02
444210011988652251512443207120203	734411134543306050410	751144421223302080803	01
444210011988512545324354201120608	253324225555212110409	49 1 12 5 1 1	02
444260011931531222332444302050709	624441255532305061112	622253422312310071101	01
444260011931224334222333112060107	244244224434403060708	48 1 12 4 1 1	02
444150011982 55151115555504070803	1111111511112010711	55151555553507080911	01
444150011982 15151555111501030611	51115551115112010910	27 1 09 3 1 1	02
444170011984732231444343405030211	643331123442306050711	443232434232112050302	01
444170011984623112322312210040301	621143211342112030708	29 1 10 5 1 1	02
444180011985543251432344405080302	313342234521211011210	612242421243101081207	01
444180011985515245134523206010312	714423554424112010204	28 1 10 4 1 1	02
444130011980642214313423307040302	635551133313206100512	212441431231101110805	01
444130011980324114134122112060309	714534344312112011011	37 1 11 5 1 1	02
444140011981121253132533201020307	635431233532205100106	643323422312110110807	01
444140011981223255322213210071202	234223122212210090803	39 1 11 5 1 1	02
			01
			02

## DIT2: N2 and P% indexes with New Checks

9/15/98

Five story order: Famine, Reporter, SchoolBoard, Cancer, Demonstration

ID	INDEXES		SUBJECT RELIABILITY CHECKS				
	N2	P%	RtXRk	M	MISRT	MISRK	NoDIF
11101	13.11495	20	34	0	0	0	0
11102	36.73128	38	0	1	0	0	0
11103	53.04486	48	3	0	0	0	0
11104	51.81194	46	0	8	0	0	0
11105	67.94475	66	48	1	0	0	0
11106	18.75638	26	0	0	0	0	0
11107	44.72941	32	4	3	0	0	0
11108	33.84005	20	0	2	0	0	0
11109	53.75072	48	26	3	0	0	0
11110	29.18604	52	154	0	0	0	0
11111	23.04221	20	55	3	0	0	0
11112	11.19979	14	-3	1	0	0	0
11115 purged	99.9	99.9	295 *	0	0	8 *	1
11117	16.61412	28	131	0	0	0	0
11119	22.52255	16	172	3	0	0	0
11121	29.06482	34	0	0	0	0	0
11122	52.86754	56	49	0	0	4	0
11123	42.03241	42	0	0	0	0	0
11124	23.15929	36	146	1	0	0	0
11125	27.4019	30	0	1	0	0	1
11126	50.24417	50	13	1	0	0	0
22202	54.77673	50	0	0	0	0	0
22203	63.64992	70	5	0	0	0	0
22209	52.19957	56	16	0	0	1	0
22216	34.3325	30	33	1	0	0	0
22219	16.49645	4	30	0	0	0	0
22220	31.99578	24	45	0	0	0	0
22221	20.69433	34	59	0	0	0	0
22222	56.56299	56	0	4	0	0	0
22223	45.44735	50	26	0	0	0	0
22224	39.31959	40	12	0	0	0	0
22230	1.459112	14	155	0	0	0	0
33302	6.584157	18	97	0	0	0	0
33303	31.2484	30	78	0	0	0	0
33305 purged	99.9	20	295 *	0	4 *	6	0
33314 purged	99.9	99.9	575 *	0	0	19 *	4 *
33316 purged	10.64315	32	232 *	0	0	0	0
33317	25.77282	20	61	4	0	0	0
33318	40.69233	38	0	1	0	0	0
33321	36.46141	42	27	0	0	0	0
33325	30.09242	36	0	0	0	0	0
44402	61.60233	58	0	1	0	0	0
44405	45.21961	38	70	4	0	0	0
44411	42.72641	38	33	3	0	0	0
44421	39.05864	46	40	0	0	0	0
44426	35.42651	42	14	0	0	0	0
44415	18.41011	22	77	6	0	0	1
44417	14.71745	20	2	0	0	0	0
44418	27.47267	18	6	3	0	0	0
44413	40.83257	38	0	3	0	0	0

44414 | 38.80002 | 40 | | 44 | 0 | 0 | 0 | 0

Total number of subjects listed: 51

Total number of subjects purged: 4

=====

NOTE: ID=5-digit identification number assigned by researcher.

N2=NewIndex2, adjusted. Recommended index.

P%=Percent of weighted ranks attributed to Postconventional items (traditional index)

RtXRk=Rate/Rank inconsistencies. If more than 200, protocol is invalidated.

M=endorsement of Meaningless but high sounding items. More than 10 invalidates.

MISRT=# of stories with too many missing rates (>3). More than 1 invalidates.

MISRK=number of ranks that are missing. Missing more than 6 invalidates.

NoDIF=Non-differentiation of ratings or rankings. More than 1 story invalidates.

99.9=indicator of missing values; is not a real value.

(See GUIDE2 for details.)

**Descriptive Statistics for Total Sample and Subsamples**

----- DIT2 INDEXES -----		
GROUP	N2	P%
Sub 1	MEAN 35.1	36.1
(n= 20 )	SD 16.2	14.6
Sub 2	MEAN 37.9	38.9
(n= 11 )	SD 19.2	19.9
Sub 3	MEAN 28.5	30.7
(n= 6 )	SD 11.9	9.9
Sub 4	MEAN 36.4	36.0
(n= 10 )	SD 13.6	12.6
TOTAL	MEAN 35.2	36.0
(N= 47 )	SD 15.7	14.9

NOTE: Missing data is indicated by 0.000. The TOTAL group is your whole sample before breaking it down by subsample.

See Means and SD of other samples in GUIDE2.

For comparison, norms for the mean P% score for DIT1 is as follows:

Junior high school=20.0; Senior high=31.0; College students=43.2;

Grad students=44.9; Moral philosophers=65.1

Statistical Analysis: t-tests on the P score  
Differences Between The Sub-groups in Your Data

Group	Statistic	Sub-groups									
		Sub 0	Sub 1	Sub 2	Sub 3	Sub 4	Sub 5	Sub 6	Sub 7	Sub 8	Sub 9
Sub 0	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 1	t-test	0.000	0.000	-0.450	0.849	0.018	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	29.	24.	28.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.643	0.409	0.392	0.000	0.000	0.000	0.000	0.000
Sub 2	t-test	0.000	0.450	0.000	0.943	0.395	0.000	0.000	0.000	0.000	0.000
	df	0.	29.	0.	15.	19.	0.	0.	0.	0.	0.
	prob	0.000	0.643	0.000	0.363	0.667	0.000	0.000	0.000	0.000	0.000
Sub 3	t-test	0.000	-0.849	-0.943	0.000	-0.884	0.000	0.000	0.000	0.000	0.000
	df	0.	24.	15.	0.	14.	0.	0.	0.	0.	0.
	prob	0.000	0.409	0.363	0.000	0.395	0.000	0.000	0.000	0.000	0.000
Sub 4	t-test	0.000	-0.018	-0.395	0.884	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	28.	19.	14.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.392	0.667	0.395	0.000	0.000	0.000	0.000	0.000	0.000
Sub 5	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 6	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 7	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 8	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 9	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: A sub-group matched with itself is indicated by zeros  
Where there are no subgroups zeros are also shown.

Statistical Analysis: t-tests on the N2 scores  
Differences Between The Sub-groups in Your Data

Group	Statistic	Sub-groups									
		Sub 0	Sub 1	Sub 2	Sub 3	Sub 4	Sub 5	Sub 6	Sub 7	Sub 8	Sub 9
Sub 0	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 1	t-test	0.000	0.000	-0.440	0.920	-0.231	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	29.	24.	28.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.648	0.370	0.680	0.000	0.000	0.000	0.000	0.000
Sub 2	t-test	0.000	0.440	0.000	1.085	0.201	0.000	0.000	0.000	0.000	0.000
	df	0.	29.	0.	15.	19.	0.	0.	0.	0.	0.
	prob	0.000	0.648	0.000	0.296	0.667	0.000	0.000	0.000	0.000	0.000
Sub 3	t-test	0.000	-0.920	-1.085	0.000	-1.184	0.000	0.000	0.000	0.000	0.000
	df	0.	24.	15.	0.	14.	0.	0.	0.	0.	0.
	prob	0.000	0.370	0.296	0.000	0.256	0.000	0.000	0.000	0.000	0.000
Sub 4	t-test	0.000	0.231	-0.201	1.184	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	28.	19.	14.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.680	0.667	0.256	0.000	0.000	0.000	0.000	0.000	0.000
Sub 5	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 6	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 7	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 8	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub 9	t-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	df	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	prob	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: A sub-group matched with itself is indicated by zeros  
Where there are no subgroups zeros are also shown.

APPENDIX H

SAMPLE MASTER DATA FILE

## H1

SAMPLE MASTER DATA FILE							
Sub-group	ID	Sex	P%	Age	Ed	PolCon	Reliability
Aeronautical Center	11101	1	20	50	11	2	
Aeronautical Center	11102	1	38	48	11	4	
Aeronautical Center	11103	1	48	40	10	2	
Aeronautical Center	11104	2	46	51	11	4	
Aeronautical Center	11105	2	66	55	9	2	
Aeronautical Center	11106	1	26	35	6	4	
Aeronautical Center	11107	2	32	43	11	2	
Aeronautical Center	11108	1	20	57	11	4	
Aeronautical Center	11109	1	48	56	9	5	
Aeronautical Center	11110	2	52	57	11	2	
Aeronautical Center	11111	1	20	57	9	2	
Aeronautical Center	11112	1	14	75	11	4	
Aeronautical Center	11115	1	.	47	10	3	Purged
Aeronautical Center	11117	1	28	55	13	4	
Aeronautical Center	11119	1	16	38	12	3	
Aeronautical Center	11121	1	34	40	11	4	
Aeronautical Center	11122	2	56	39	11	2	
Aeronautical Center	11123	2	42	44	12	4	
Aeronautical Center	11124	1	36	45	11	2	
Aeronautical Center	11125	1	30	56	11	5	
Aeronautical Center	11126	1	50	49	11	3	
Regulatory	22202	1	50	47	10	2	
Regulatory	22203	2	70	0	11	2	
Regulatory	22209	1	56	46	12	2	
Regulatory	22216	1	30	53	12	4	
Regulatory	22219	1	4	50	7	4	
Regulatory	22220	1	24	49	12	3	
Regulatory	22221	1	34	52	12	3	
Regulatory	22222	1	56	53	11	2	
Regulatory	22223	2	50	46	10	2	
Regulatory	22224	1	40	59	11	4	
Regulatory	22230	1	14	48	10	3	
Manufacturing	33302	1	18	40	8	4	
Manufacturing	33303	1	30	56	11	4	
Manufacturing	33305	1	.	58	5	4	Purged
Manufacturing	33314	1	.	51	11	4	Purged
Manufacturing	33316	1	.	52	12	4	Purged
Manufacturing	33317	1	20	30	9	2	
Manufacturing	33318	1	38	48	12	5	
Manufacturing	33321	1	42	52	9	4	
Sub-group	ID	Sex	P%	Age	Ed	PolCon	Reliability
Operations	44402	2	58	38	10	2	
Operations	44405	1	38	64	9	2	
Operations	44411	1	38	42	11	3	

Operations	44421	1	46	49	12	5
Operations	44426	1	42	48	12	4
Operations	44415	1	22	27	9	3
Operations	44417	1	20	29	10	5
Operations	44418	1	18	28	10	4
Operations	44413	1	38	37	11	5
Operations	44414	1	40	39	11	5

---

<i>N</i> =	51
<i>Average P% Score</i> =	36.0
<i>Average age</i> =	46.8
<i>Average Education</i> =	10.4
<i>Political Status</i> =	3.4

---

APPENDIX I

KOHLBERG'S LEVELS AND STAGES OF  
MORAL DEVELOPMENT

The table below compiles and simplifies the levels and stages of moral development as theorized by Kohlberg. It is meant to provide a simpler, albeit somewhat different, view of the information to help the reader better identify with the issues in a more temporal context. The more technical definitions are contained on O2.

Kohlberg's Levels and Stages of Moral Development - Simplified

<i>Stages</i>	<i>Description</i>
Preconventional	Moral values are reflective of one's needs, wants, and desires.
Stage 1	The morality of obedience: Do what you are told.
Stage 2	The morality of instrumental egoism and simple exchange: Let's make a deal.
Conventional	Moral values are found in society's expectations of behavior.
Stage 3	The morality of interpersonal concordance: Be considerate, nice, and kind; you'll make friends.
Stage 4	The morality of law and duty to the social order: Everyone in society is obligated to and protected by the law.
Postconventional	Moral values are reflective of global principals of human rights and responsibilities. Principals are not necessarily a reflection of the group one belongs to.
Stage 5	The morality of consensus-building procedures: You are obligated by the arrangements that are agreed to by due process procedures.
Stage 6	The morality of nonarbitrary social cooperation: Morality is defined by how rational and impartial people would ideally organize cooperation.

Adapted from Rest & Narvaez (1994).

---

 KOHLBERG'S LEVEL'S AND STAGES OF MORAL DEVELOPMENT
 

---

<i>Level I:</i>	<i>Preconventional Morality</i>	<i>Behavior motivated by anticipation of pleasure or pain.</i>
Stage 1	Punishment and conformity	Characterized by the avoidance of behavior obedience would break rules that were backed up by punishment.
Stage 2	Instrumental exchange	Characterized by selfish behavior and allowing others to do the same. Will follow the rules only when it is in the interest of the individual. Rightness is defined by a fair exchange between parties.
<i>Level II:</i>	<i>Conventional Morality</i>	<i>Behavior motivated by an acceptance of the rules and standards of one's group.</i>
Stage 3	Interpersonal conformity	Characterized by behavior that is accepted by society and individual acts to gain approval within that society. A respect for trust, loyalty and belief in the <i>Golden Rule</i> .
Stage 4	Law and order	Characterized by a respect for rules, laws, and appropriate authority. Possesses a responsibility for the welfare of society in general. Believes <i>correct</i> behavior is that which supports the social order for its own sake.
<i>Level III:</i>	<i>Postconventional Morality</i>	<i>Behavior motivated by Ethical principals.</i>
Stage 5	Prior rights and social contract	The rules of society represent a contractual responsibility. Rightness of behavior is dictated by the consequences to the welfare of society in general. Individual rights are generalized into the rights of society as a whole.
Stage 6	Universal ethical principals	Transcends the social contract to the consideration of the rights of human beings regardless of social membership. The dignity of all human beings becomes the focus of decisions and individual behavior.

---

Adapted from Kohlberg (1984)

APPENDIX J

DIT DEMOGRAPHIC ANALYSIS CHARTS

J1

GENDER COMPARISONS  
(male)

<b>Gender - Male</b>					
<b>ID</b>	<b>Sex</b>	<b>P%</b>	<b>Age</b>	<b>Ed</b>	<b>PolCon</b>
11101	1	20	50	11	2
11102	1	38	48	11	4
11103	1	48	40	10	2
11106	1	26	35	6	4
11108	1	20	57	11	4
11109	1	48	56	9	5
11111	1	20	57	9	2
11112	1	14	75	11	4
11117	1	28	55	13	4
11119	1	16	38	12	3
11121	1	34	40	11	4
11124	1	36	45	11	2
11125	1	30	56	11	5
11126	1	50	49	11	3
22202	1	50	47	10	2
22209	1	56	46	12	2
22216	1	30	53	12	4
22219	1	4	50	7	4
22220	1	24	49	12	3
22221	1	34	52	12	3
22222	1	56	53	11	2
22224	1	40	59	11	4
22230	1	14	48	10	3
33302	1	18	40	8	4
33303	1	30	56	11	4
33317	1	20	30	9	2
33318	1	38	48	12	5
33321	1	42	52	9	4
33325	1	36	57	9	4
44405	1	38	64	9	2
44411	1	38	42	11	3
44421	1	46	49	12	5
44426	1	42	48	12	4
44415	1	22	27	9	3
44417	1	20	29	10	5
44418	1	18	28	10	4
44413	1	38	37	11	5
44414	1	40	39	11	5
N =		38			
Mean		32.2	47.5	10.4	3.5
Median		34	48.5	11	4
Mode		20	48	11	4
Std Dev		12.82	10.28	1.50	1.06

J2

GENDER COMPARISONS  
(Female)

<i>Gender - Female</i>					
<i>ID</i>	<i>Sex</i>	<i>P%</i>	<i>Age</i>	<i>Ed</i>	<i>PolCon</i>
11104	2	46	51	11	4
11105	2	66	55	9	2
11107	2	32	43	11	2
11110	2	52	57	11	2
11122	2	56	39	11	2
11123	2	42	44	12	4
22203	2	70	0	11	2
22223	2	50	46	10	2
44402	2	58	38	10	2
<i>ID</i>	<i>Sex</i>	<i>P%</i>	<i>Age</i>	<i>Ed</i>	<i>PolCon</i>
N = 9					
Mean		52.4	41.4	10.7	2.4
Median		58	38	10	2
Mode		#N/A	#N/A	11	2
StdDev		11.78	16.89	0.87	0.88

J3

AGE COMPARISONS  
(39 Year Olds and below)

<i>Age - 39 Year Olds and below</i>					
<b>ID</b>	<b>Sex</b>	<b>P%</b>	<b>Age</b>	<b>Ed</b>	<b>PolCon</b>
11106	1	26	35	6	4
11119	1	16	38	12	3
11122	2	56	39	11	2
22203	2	70	0	11	2
33317	1	20	30	9	2
44402	2	58	38	10	2
44413	1	38	37	11	5
44414	1	40	39	11	5
44415	1	22	27	9	3
44417	1	20	29	10	5
44418	1	18	28	10	4
N =		11			
Mean		34.9	30.9	10.0	3.4
Median		26	35	10	3
Mode		20	38	11	2
StdDev		18.92	11.26	1.61	1.29

J4

AGE COMPARISONS  
(40 to 49 Year Olds)

<i>Age - 40 to 49 Year Olds</i>					
<b>ID</b>	<b>Sex</b>	<b>P%</b>	<b>Age</b>	<b>Ed</b>	<b>PolCon</b>
11102	1	38	48	11	4
11103	1	48	40	10	2
11107	2	32	43	11	2
11121	1	34	40	11	4
11123	2	42	44	12	4
11124	1	36	45	11	2
11126	1	50	49	11	3
22202	1	50	47	10	2
22209	1	56	46	12	2
22220	1	24	49	12	3
22223	2	50	46	10	2
22230	1	14	48	10	3
33302	1	18	40	8	4
33318	1	38	48	12	5
44411	1	38	42	11	3
44421	1	46	49	12	5
44426	1	42	48	12	4
N = 17					
Mean		38.6	45.4	10.9	3.2
Median		38	46	11	3
Mode		38	48	11	2
StdDev		11.66	3.32	1.09	1.07

J5

AGE COMPARISONS  
(50 Year Olds and above)

<i>Age - 50 Year Olds and above</i>					
<i>ID</i>	<i>Sex</i>	<i>P%</i>	<i>Age</i>	<i>Ed</i>	<i>PolCon</i>
11101	1	20	50	11	2
11104	2	46	51	11	4
11105	2	66	55	9	2
11108	1	20	57	11	4
11109	1	48	56	9	5
11110	2	52	57	11	2
11111	1	20	57	9	2
11112	1	14	75	11	4
11117	1	28	55	13	4
11125	1	30	56	11	5
22216	1	30	53	12	4
22219	1	4	50	7	4
22221	1	34	52	12	3
22222	1	56	53	11	2
22224	1	40	59	11	4
33303	1	30	56	11	4
33321	1	42	52	9	4
33325	1	36	57	9	4
44405	1	38	64	9	2
N =		19			
Mean		34.4	56.1	10.4	3.4
Median		34	56	11	4
Mode		20	57	11	4
StdDev		15.39	5.71	1.46	1.07

J6

EDUCATION COMPARISONS  
(Freshman through Senior in college)

<i>Education - Freshman through Senior in College</i>					
<b>ID</b>	<b>Sex</b>	<b>P%</b>	<b>Age</b>	<b>Ed</b>	<b>PolCon</b>
11105	2	66	55	9	2
11106	1	26	35	6	4
11109	1	48	56	9	5
11111	1	20	57	9	2
22219	1	4	50	7	4
33302	1	18	40	8	4
33317	1	20	30	9	2
33321	1	42	52	9	4
33325	1	36	57	9	4
44405	1	38	64	9	2
44415	1	22	27	9	3
N =		11			
Mean		30.9	47.5	8.5	3.3
Median		26	52	9	4
Mode		20	57	9	4
StdDev		17.19	12.44	1.04	1.10

J7

EDUCATION COMPARISONS  
(Professional Degree)

<i>Education - Professional Degree</i>					
<i>ID</i>	<i>Sex</i>	<i>P%</i>	<i>Age</i>	<i>Ed</i>	<i>PolCon</i>
11103	1	48	40	10	2
22202	1	50	47	10	2
22223	2	50	46	10	2
22230	1	14	48	10	3
44402	2	58	38	10	2
44417	1	20	29	10	5
44418	1	18	28	10	4
N = 7					
Mean		36.9	39.4	10.0	2.9
Median		48	40	10	2
Mode		50	#N/A	10	2
StdDev		18.61	8.32	0.00	1.21

J8

EDUCATION COMPARISONS  
(Masters Degree)

<i>Education - Masters Degree</i>					
<i>ID</i>	<i>Sex</i>	<i>P%</i>	<i>Age</i>	<i>Ed</i>	<i>PolCon</i>
11101	1	20	50	11	2
11102	1	38	48	11	4
11104	2	46	51	11	4
11107	2	32	43	11	2
11108	1	20	57	11	4
11110	2	52	57	11	2
11112	1	14	75	11	4
11121	1	34	40	11	4
11122	2	56	39	11	2
11124	1	36	45	11	2
11125	1	30	56	11	5
11126	1	50	49	11	3
22203	2	70	0	11	2
22222	1	56	53	11	2
22224	1	40	59	11	4
33303	1	30	56	11	4
44411	1	38	42	11	3
44413	1	38	37	11	5
44414	1	40	39	11	5
N =		19			
Mean		38.9	47.2	11.0	3.3
Median		38	49	11	4
Mode		38	57	11	2
StdDev		13.89	14.69	0.00	1.16

J9

EDUCATION COMPARISONS  
(Doctoral Degree)

<i>Education - Doctoral Degree</i>					
ID	Sex	P%	Age	Ed	PolCon
11117	1	28	55	13	4
11119	1	16	38	12	3
11123	2	42	44	12	4
22209	1	56	46	12	2
22216	1	30	53	12	4
22220	1	24	49	12	3
22221	1	34	52	12	3
33318	1	38	48	12	5
44421	1	46	49	12	5
44426	1	42	48	12	4
N =		10			
Mean		35.6	48.2	12.1	3.7
Median		36	48.5	12	4
Mode		42	49	12	4
StdDev		11.65	4.85	0.32	0.95

J10

POLITICAL VIEWS COMPARISONS  
(Somewhat Liberal)

<i>Political Views - Somewhat Liberal</i>					
ID	Sex	P%	Age	Ed	PolCon
11101	1	20	50	11	2
11103	1	48	40	10	2
11105	2	66	55	9	2
11107	2	32	43	11	2
11110	2	52	57	11	2
11111	1	20	57	9	2
11122	2	56	39	11	2
11124	1	36	45	11	2
22202	1	50	47	10	2
22203	2	70	0	11	2
22209	1	56	46	12	2
22222	1	56	53	11	2
22223	2	50	46	10	2
33317	1	20	30	9	2
44402	2	58	38	10	2
44405	1	38	64	9	2
N =		16			
Mean		45.5	44.4	10.3	2.0
Median		50	46	10.5	2
Mode		20	57	11	2
StdDev		16.07	14.61	0.95	0.00

J11

POLITICAL VIEWS COMPARISONS  
(Neither Liberal nor Conservative)

<i>Political Views - Neither Liberal nor Conservative</i>					
<b>ID</b>	<b>Sex</b>	<b>P%</b>	<b>Age</b>	<b>Ed</b>	<b>PolCon</b>
11119	1	16	38	12	3
11126	1	50	49	11	3
22220	1	24	49	12	3
22221	1	34	52	12	3
22230	1	14	48	10	3
44411	1	38	42	11	3
44415	1	22	27	9	3
N =		7			
Mean		28.3	43.6	11.0	3.0
Median		24	48	11	3
Mode		#N/A	49	12	3
StdDev		12.98	8.73	1.15	0.00

J12

POLITICAL VIEWS COMPARISONS  
(Somewhat Conservative)

<i>Political Views - Somewhat Conservative</i>					
ID	Sex	P%	Age	Ed	PolCon
11102	1	38	48	11	4
11104	2	46	51	11	4
11106	1	26	35	6	4
11108	1	20	57	11	4
11112	1	14	75	11	4
11117	1	28	55	13	4
11121	1	34	40	11	4
11123	2	42	44	12	4
22216	1	30	53	12	4
22219	1	4	50	7	4
22224	1	40	59	11	4
33302	1	18	40	8	4
33303	1	30	56	11	4
33321	1	42	52	9	4
33325	1	36	57	9	4
44418	1	18	28	10	4
44426	1	42	48	12	4
N =		17			
Mean		29.9	49.9	10.3	4.0
Median		30	51	11	4
Mode		42	48	11	4
StdDev		11.84	10.70	1.90	0.00

J13

POLITICAL VIEWS COMPARISONS  
(Very Conservative)

<i>Political Views - Very Conservative</i>					
<i>ID</i>	<i>Sex</i>	<i>P%</i>	<i>Age</i>	<i>Ed</i>	<i>PolCon</i>
11109	1	48	56	9	5
11125	1	30	56	11	5
33318	1	38	48	12	5
44413	1	38	37	11	5
44414	1	40	39	11	5
44417	1	20	29	10	5
44421	1	46	49	12	5
N =		7			
Mean		37.1	44.9	10.9	5.0
Median		38	48	11	5
Mode		38	56	11	5
StdDev		9.58	10.19	1.07	0.00

APPENDIX K

PLATO'S ALLEGORY OF THE CAVE

## K1

## Excerpts from Plato's Allegory of the Cave

"Next, then," I said, "make an image of our nature in its education and want of education, likening it to a condition of the following kind. See human beings as though they were in an underground cave-like dwelling with its entrance, a long one, open to the light across the whole width of the cave. They are in it from childhood with their legs and necks in bonds so that they are fixed, seeing only in front of them, unable because of the bond to turn their heads all the way around. Their light is from a fire burning far above and behind them. Between the fire and the prisoners there is a road above, along which see a wall, built like the partitions puppet-handlers set in front of the human beings and over which they show the puppets."

"Then also see along this wall human beings carrying all sorts of artifacts, which project above the wall, and statues of men and other animals wrought from stone, wood, and every kind of material; as is to be expected, some of the carriers utter sounds while others are silent."

"It's a strange image," he said, "and strange prisoners you're telling of."

"They're like us," I said. "For in the first place, do you suppose such men would have seen anything of themselves and one another other than the shadows cast by the fire on the side of the cave facing them?"

"How could the," he said, "if they had been compelled to keep their heads motionless throughout life?"

"And what about the things that are carried by? Isn't it the same with them?"

"Of course."

"If they were able to discuss things with one another, don't you believe they would hold that they are naming these things going by before them that they see?"

"Necessarily."

"And what if the prison also had an echo from the side facing them? Whenever one of the men passing by happens to utter a sound, do you suppose they would believe that anything other than the passing shadow was uttering the sound?"

"No, by Zeus," he said. "I don't."

"Then most certainly," I said, "such men would hold that the truth is nothing other than the shadows of artificial things."

"Most necessarily," he said.

"Now consider," I said, "what their release and healing from bonds and folly would be like if something of this sort were by nature to happen to them. Take a man who is released and suddenly compelled to stand up, to turn his neck around, to walk and look up toward the light; and who, moreover, in doing all this is in pain and, because he is dazzled, is unable to make out those things whose shadows he saw before. What do you suppose he'd say if someone were to tell him that before he saw silly nothings, while now, because he is somewhat nearer to what is and more turned toward beings, he sees more correctly; and, in particular, showing him each of the things that pass by, were to compel the man to answer his questions about what they are? Don't you suppose he'd be at a loss and believe that what was seen before is truer than what is now shown?"

"Yes," he said, "by far."

“And, if he compelled him to look at the light itself, would his eyes hurt and would he flee, turning away to those things that he is able to make out and hold them to be really clearer than what is being shown?”

“So he would,” he said.

“And if,” I said, “someone dragged him away from there by force along the rough, steep, upward way and didn’t let him go before he had dragged him out into the light of the sun, wouldn’t he be distressed and annoyed at being so dragged? And when he came to the light, wouldn’t he have his eyes full of its beam and be unable to see even one of the things now said to be true?”

“No, he wouldn’t,” he said, “at least not right away.”

“Then I suppose he’d have to get accustomed, if he were going to see what’s up above. At first he’d most easily make out the shadows; and after that the phantoms of the human beings and the other things in water; and, later, the things themselves. And from there he could turn to beholding the things in heaven and heaven itself, more easily at night—looking at the light of the stars and the moon—than by day—looking at the sun and sunlight.”

“Of course.”

“Then finally I suppose he would be able to make out the sun—not its appearances in water or some alien place, but the sun itself by itself in its own region—and see what it’s like.”

“Necessarily,” he said.

“And after that he would already be in a position to conclude about it that this is the source of the seasons and the years, and is the steward of all things in the visible place, and is in a certain way the cause of all those things he and his companions had been seeing.”

“It’s plain,” he said, “that this would be his next step.”

“What then? When he recalled his first home and the wisdom there, and his fellow prisoners in that time, don’t you suppose he would consider himself happy for the change and pity the others?”

“Quite so.”

“And if in that time there were among them any honors, praises, and prizes for the man who is sharpest at making out the things that go by, and most remembers which of them are accustomed to pass before, which after, and which at the same time as others, and who is thereby most able to divine what is going to come, in your opinion would he be desirous of them and envy those who are honored and hold power among these men? Or, rather, would he be affected as Homer says and want very much ‘to be on the soil, a serf to another man, to a portionless man, and to undergo anything whatsoever rather than to opine those things and live that way?’”

“Yes,” he said, “I suppose he would prefer to undergo everything rather than live that way.”

“Now reflect on this too,” I said. “If such a man were to come down again and sit in the same seat, on coming suddenly from the sun wouldn’t his eyes get infected with darkness?”

“Very much so,” he said.

“And if he once more had to compete with those perpetual prisoners in forming judgments about those shadows while his vision was still dim, before his eyes had recovered, and if the time needed for getting accustomed were not at all short, wouldn’t he be the source

of laughter, and wouldn't it be said of him that he went up and came back with his eyes corrupted, and that it's not even worth trying to go up? And if they were somehow able to get their hands on and kill the man who attempts to release and lead up, wouldn't they kill him?"

"No doubt about it," he said.

"Well, then, my dear Glaucon," I said, "this image as a whole must be connected with what was said before. Liken the domain revealed through sight to the prison home, and the light of the fire in it to the sun's power; and, in applying the going up and the seeing of what's above to the soul's journey up to the intelligible place, you'll not mistake my expectation, since you desire to hear it. A god doubtless knows if it happens to be true. At all events, this is the way the phenomena look to me: in the knowable the last thing to be seen, and that with considerable effort, is the *idea* of the good; but once seen, it must be concluded that this is in fact the cause of all that is right and fair in everything—in the visible it gave birth to light and its sovereign; in the intelligible, itself sovereign, it provided truth and intelligence—and that the man who is going to act prudently in private or in public must see it."

"I, too, join you in supposing that," he said, "at least in the way I can."

"Come, then," I said, "and join me in supposing this, too, and don't be surprised that the men who get to that point aren't willing to mind the business of human beings, but rather that their soul are always eager to spend their time above. Surely that's likely, if indeed this, too, follows the image of which I told before."

"Of course it's likely," he said.

"And what about this? Do you suppose it is anything surprising," I said, "if a man, come from acts of divine contemplation to the human evils, is graceless and looks quite ridiculous when—with his sight still dim and before he has gotten sufficiently accustomed to the surrounding darkness—he is compelled in courts or elsewhere to contest about the shadows of the just or the representations of which they are the shadows, and to dispute about the way these things are understood by men who have never seen justice itself?"

"It's not at all surprising," he said.

"But if a man were intelligent," I said, "he would remember that there are two kinds of disturbances of the eyes, stemming from two sources—when they have been transferred from light to darkness and when they have been transferred from darkness to light. And if he held that these same things happen to a soul too, whenever he saw one that is confused and unable to make anything out, he wouldn't laugh without reasoning but would go on to consider whether, come from a brighter life, it is in darkness for want of being accustomed, or whether, going from greater lack of learning to greater brightness, it is dazzled by the greater brilliance. And then he would deem the first soul happy for its condition and its life, while he would pity the second. And, if he wanted to laugh at the second soul, his laughing in this case would be less a laugh of scorn than would his laughing at the should which has come from above out of the light."

"What you say is quite sensible," he said.

"Then, if this is true," I said, "we must hold the following about these things; education is not what the professions of certain men assert it to be. They presumable assert that they put into the soul knowledge that isn't in it, as though they were putting sight into blind eyes."

"Yes," he said, "they do indeed assert that."

“But the present argument, on the other hand,” I said, “indicates that this power is in the soul of each, and that the instrument with which each learns—just as an eye is not able to turn toward the light from the dark without the whole body—must be turned around from that which is *coming into being* together with the whole soul until it is able to endure looking at that which *is* and the brightest part of that which *is*. And we affirm that this is the good, don’t we?”

“Yes.”

“There would, therefore,” I said, “be an art of this turning around, concerned with the way in which this power can most easily and efficiently be turned around, not an art of producing sight in it. Rather, this art takes as given that sight is there, but not rightly turned nor looking at what it ought to look at, and accomplishes this object.”

(Plato, 1968, pp.193-197)

APPENDIX L

CENTER FOR THE STUDY OF ETHICAL

DEVELOP REPRINT/ADAPTATION

PERMISSION

**CENTER for the study of  
ETHICAL DEVELOPMENT**

*University of Minnesota*

---

Darcia Narvaez, Executive Director / 206 Burton Hall / 178 Pillsbury Drive SE / Minneapolis, MN 55455 / (612) 624-0876 / FAX: (612) 624-8241  
Steve Thoma, Research Director / 206 Burton Hall / 178 Pillsbury Drive SE / Minneapolis, MN 55455 / (612) 624-0876 / FAX: (612) 624-8241  
Muriel Bebeau, Education Director / 15-136 Moos Tower / Health Ecology / 515 Delaware Street SE / Minneapolis, MN 55455 / (612) 625-4633

Wednesday, September 20, 2000

Mr. Ned Reese  
900 Augusta Ave.  
Edmond, OK 73034

Dear Mr. Reese:

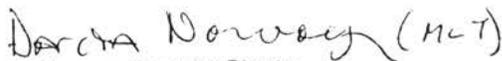
I grant you permission to use the Defining Issues Test in your current study. If you are using DIT-1 (1979) and making copies of the test items for hand scoring, please include the copyright information on each copy (e.g., Copyright, James Rest, 1979, All Rights Reserved).

If you are using the DIT-2 (1998), you must use the Center's scoring service.

I also grant you permission to reprint the Defining Issues Test as an appendix in your dissertation or report for publication. This includes the stories and test items, but not the scoring key or stage designations for specific items. Please make sure that the copy contains the usual copyright information. I understand that copies of your dissertation may be duplicated for distribution.

Please send me a copy of the report of your study. Thanks for your interest in the Defining Issues Test.

Sincerely,



Darcia Narvaez, Executive Director  
Associate Professor  
Educational Psychology

APPENDIX M

AEROSPACE DECISION-MAKING ETHICS  
COURSE SYLLABUS

## M1

The Ethics of Decision Making – Managing Consequences  
In the  
Aviation and Space Industry

## Course Syllabus

## I. Course Description:

This course is designed to teach the fundamentals of decision-making as it applies to the aviation and space industry.

## II. Course Rationale:

The aviation and space industry is not recognized as a profession although it represents very specific applications of unique technology. The various professions that do constitute the industry possess their own professionally adopted codes of ethics that influence decision-making within their specific disciplines. However, the aviation and space industry as a whole has yet to adopt a similar ethical standard. Courses in ethics and ethical-centered decision making exist within most engineering, law, business and medical schools, but very little is done specifically to prepare the aerospace professional for their role in decision-making. The aviation and space industry is unique in that it is a discipline that possesses an extremely narrow tolerance for error and can have a monumental effect of the confidence of the flying public and the economy of the nation. This course seeks to create a high awareness on the part of aviation and space professionals with regard to their potential impact on these issues and give them skills to effectively deal with such critical problems.

## III. Pre-requisites:

None

## IV. Course Goals and Objectives:

Upon completion of this course the student will be able to:

1. Describe the aviation and space industry from a philosophical perspective.
2. Discuss professional ethics and their role in decision-making.
3. Describe and discuss methods for moral/ethical decision-making.
4. Identify typical professional dilemmas; describe the relevant issues; construct and defend viable decisions.

5. Describe and discuss the relevance of ethics with respect to decisions and policies regarding risk, safety and liability in the aviation and space industry.

V. Text:

Engineering Ethics: Concepts and Cases, 2nd Edition, Harris, Pritchard & Rabins, Wadsworth/Thompson Learning

VI. Course Outline:

1. Introduction
  - a. Grounding philosophy
  - b. Decision-Making Ethics
  - c. Why Aviation and Space?
  - d. Applications in the Professional Disciplines
2. Framing the Problem
  - a. Identification of the Problem
  - b. Analyzing the Problem
  - c. Achieving Understanding
3. Methods/Models for Problem Solving
  - a. Methods
  - b. Models
    - i. Utilitarian Model
    - ii. Humanistic Model
4. Fundamental Concerns
  - a. Responsibility
  - b. Honesty, Integrity and Reliability
  - c. Risk, Safety and Reliability
5. Professionalism
  - a. Labor/Management environments
  - b. "Political Correctness"
  - c. "Whistle-Blowing"
6. Case Studies

VII. Instructional Methods:

The primary instructional method is classroom lecture with assigned team review, discussion and presentation of selected case studies.

VITA

Ned S. Reese, III

Candidate for the Degree of

Doctor of Education

Thesis: A MEASURE OF DECISION MAKING ETHICS WITHIN THE AVIATION  
AND AEROSPACE INDUSTRY

Major Field: Applied Educational Studies

Biographical:

Personal Data: Born in Bruce, Mississippi, on December 13, 1945, the son of Ned Seay and Juanella Dove Reese. Raised in Rolling Fork, Mississippi, located in the rural Mississippi Delta from 1946 to 1964.

Education: Graduated from Rolling Fork High School, Rolling Fork, Mississippi in May 1964; received Associate of Science degree in Computer Science from Memphis State Technical Institution, Memphis, Tennessee, June, 1974; received Bachelor of Science degree in Management from Southern Nazarene University, Bethany, Oklahoma, December, 1997; received Master of Science degree in Natural and Applied Sciences from Oklahoma State University, Stillwater, Oklahoma, December, 1998. Completed the requirements for the Doctor of Education degree with a major in Aviation and Aerospace Management at Oklahoma State University in December, 2000.

Experience: Employed by the Tennessee Valley Authority (TVA) in the River Planning Division, Maps and Surveys Branch as a civil engineering field surveys technician, 1967-1969; employed by the Federal Aviation Administration as an air traffic controller at the Memphis Air Route Traffic Control Center (ARTCC) in 1969. Selected as a Data Systems Specialist at the Memphis ARTCC in 1974; served as a Staff Specialist in the Automation Division of the Air Traffic Service (ATS) in Washington, D.C. 1976-1979; served as a Staff Specialist in the Operations and Procedures Division of the ATS in Washington, D.C., 1979-1982; served

as an Area Supervisor (control room operations) at the Kansas City ARTCC 1982-1983; served as the Assistant Manger for Traffic Management at the Kansas City ARTCC 1983-1984; served as Area Manager (Operations) at Kansas City ARTCC 1984-1986; served as the Assistant Air Traffic Manager for the Denver ARTCC from 1986-1990; served as the Manager for Air Traffic Training Requirements Division in Washington, D.C. 1990-1992; served as the Division Manager for the Air Traffic Division, FAA Academy, in Oklahoma City, Oklahoma, 1992-Present.

Professional Memberships: Air Traffic Control Association (ATCA), Associate Supporting Member of the Professional Women's Controller Association (PWC), University Aviation Association (UAA).

Honors and Awards: Phi Kappa Phi Honor Society member, recipient of "The Scott M. Myers Award for Applied Psychology in the Workplace" Award from the Society of Industrial and Organizational Psychologists, national recipient of the FAA "Friend of the Office of Aviation Medicine Award", "Distinguished Achievement Award" from Southern Nazarene University, co-recipient of the AXO FAA Administrator's "Spirit Award - 1993."