An exploratory study of entrepreneurial arts and sciences faculty in the context of their work environments

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AN EXPLORATORY STUDY OF ENTREPRENEURIAL
ARTS AND SCIENCES FACULTY IN THE CONTEXT OF
THEIR WORK ENVIRONMENTS

A Dissertation
Presented to
The Faculty of the School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Philosophy

by
Ronald Myers Hunt
April 2002
AN EXPLORATORY STUDY OF ENTREPRENEURIAL
ARTS AND SCIENCES FACULTY IN THE CONTEXT OF
THEIR WORK ENVIRONMENTS

By

Ronald Myers Hunt

Approved April 2002

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Chair of Doctoral Committee

Roger G. Baldwin, Ph.D.

David W. Leslie, Ed.D.
DEDICATION

To my family ("The Hunt Group"): my wife, Heather, and my children, Zachary, Joshua, Abigail, and Katherine: For your encouragement, sacrifices, patience, and love.
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ABSTRACT

Academic entrepreneurship is a topic of current debate and controversy within American higher education. The purpose of this study was to obtain insights concerning the working styles of highly entrepreneurial faculty and the key enhancements and barriers to their entrepreneurial activities. The researcher's approach to this topic was informed by a review of the literature in the areas of general organizational and academic contexts for entrepreneurship, and literature pertaining to conditions that promote individual and organizational creativity and innovation.

A dynamic systems model of academic entrepreneurship was developed and used in the study. The model suggested that individual academic entrepreneurship is influenced by the interaction of influences from the broad areas of individual characteristics, academic fields, individual college or university, academic departments, and societal and other influences. The aspects of the model that received primary emphasis for this study included individual working styles relating to entrepreneurship and creativity, characteristics of academic fields that promote or inhibit entrepreneurial behaviors, and institutional and departmental general conditions and climates that may promote or inhibit entrepreneurial behaviors.

The research methodology for this study was a qualitative multiple case study design. Research questions related to how nominated professors negotiate their working
environments, what general conditions enhance or inhibit their work, and how entrepreneurial behaviors may differ according to knowledge areas.

The purposeful sample for the research included seventeen nominated professors from a selective doctoral/research university within three areas of that institution's arts and sciences faculty: social sciences, arts and humanities, and natural sciences. Instrumentation included interviews with open-ended questions, a researcher-developed questionnaire, and curriculum vitae content analysis. Data analysis procedures involved content analysis of case interview data, categorization of data from the multiple sources, and cross-case analysis by themes and research questions.

Working style, organizational conditions, and disciplinary context themes were identified and discussed. The study provided confirmatory evidence for some common attributes and working styles of entrepreneurial professors, yet individual and unique variations were common. Variations among knowledge areas were subtle, with variations just as likely within broad knowledge areas as between knowledge areas. The study findings suggested the viability of considering academic entrepreneurship as a general working style with attributes associated with innovation and creativity.

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CHAPTER ONE: INTRODUCTION TO THE STUDY

This study utilized a mixed design, with a multiple case study design dominant, to examine research questions concerning nominated academic entrepreneurs in the context of their work environments. The academic entrepreneurs nominated for this study included seventeen faculty members within three broad areas of the arts and sciences division at a Carnegie Classification doctoral/research intensive university. Both the entrepreneurial working styles of nominated academic entrepreneurs and aspects of their working environments that may enhance or inhibit their working style were topics of concern for the study. The nominated entrepreneurs were studied as individual cases, as part of social sciences, arts and humanities, and natural sciences within the arts and sciences, and as representative entrepreneurs within the arts and sciences division at a doctoral/research university. Themes were identified concerning similarities and differences in the entrepreneurial behaviors and work climates of nominated entrepreneurs according to three major knowledge areas of arts and sciences.

Chapter One of this study includes sections concerning the rationale and scope of the study. Study unit of analysis, definitions of key terms, operational definition of academic entrepreneurship, problem, purpose, research questions, significance of the study, limitations, and delimitations are described in this chapter. Chapter Two includes a review of the literature. The review of the literature considers topics associated with entrepreneurship from business and other organizational contexts, literature concerning a higher education context for entrepreneurship, and literature concerning individual and organizational enhancements and inhibitors to creativity, innovation, and
entrepreneurship. Chapter Three describes the study methodology, and includes specific study procedures. Major sections of this chapter include sample, nomination process, instrumentation, limitations of the study, statement of bias, pilot study, data collection procedures, and procedures for data analysis. Chapter Four presents individual case summaries and includes data analysis tables. Chapter Five presents a discussion of the working style, organizational condition, and disciplinary context themes that emerged from the data analysis. The themes reference similarities and differences concerning the three broad knowledge areas. Chapter Six summarizes and discusses the themes across cases. The chapter also discusses implications for future research and implications for the practice of higher education.

Conceptual Framework

The conceptual framework for this study is based on the theoretical framework for understanding the new venture creation of Gartner's (1985) and Csiksentmihalyi's (1988) theory of creativity and flow in human experience. Work by Bird (1989) concerning entrepreneurship, and Blackburn and Lawrence (1995) concerning influences of faculty work also influenced development and refinement of the conceptual framework. Bird asserts that four dimensions or broad elements shape entrepreneurial behavior. These dimensions include: 1) the individual “entrepreneur who set the process in motion, and directed the early stages of the new venture”, 2) “organizational outcomes of a new organization such as career, jobs, wealth, and products, 3) process of entrepreneurship such as conceiving, creating, organizing, promoting and implementing the new organization, and 4) the environment for entrepreneurship including the "larger social, political, that support or restrict entrepreneurship" (Bird, 1989, pp. 1, 2). Gartner (1985)
formulated a theoretical framework for understanding new venture creation. The elements of his model included individuals (characteristics and motivations), environment (context), organization (outcomes), and process (behaviors and relationships) (Gartner, 1985).

According to Bird, the context for entrepreneurship is also important (Bird, 1989). The context refers to the "tapestry of events, circumstances, situations, settings, environments, and niches that surround the entrepreneurial event" (Bird, 1989, p. 138). Johnson (1985) considers the context of entrepreneurship. Personal characteristics are described as interacting with the social context to produce entrepreneurial events. Aspects of the social context include economy, politics, industry, zeitgeist, culture, and markets (Johnson, 1985).

The creative process articulated by Csikszentmihalyi (1988) described the interaction of individual characteristics, broad fields of knowledge, specific domains and micro and macro level cultures to describe factors associated with the creative process, particularly acceptance of creative innovations. Csikszentmihalyi (1988) maintained that much creativity research focuses on the contributions of the individual to the creative process, without significantly considering existing aspects of a given domain or subspecialty and influences exerted by representatives of the broader fields, and cultures. A dynamic systems view of the creative process more accurately describes the complexity associated with whether ideas, objects, or action will be judged as being creative (Csikszentmihalyi, 1988). Other scholars (e.g. Gardner, 1988; Albert & Runco citing Harrington, 1990) have considered the creative process from the perspective of a
dynamic systems model. In addition, entrepreneurship scholars have considered entrepreneurship as contextual and as a confluence of individual characteristics and environmental factors (e.g. Gartner, 1985; Johnson, 1985 cited in Bird, 1989).

Specific individual characteristics may suggest a propensity toward production of creative works. Traits such as problem finding, persistence, tolerance for ambiguity, and ability to concentrate, are believed to be associated with production of works likely to be judged as creative (Csikszentmihalyi, 1990). Personal experiences of individuals and genetic predispositions of individuals interacting within social systems, including fields, cultures, and domains all affect how creative an individual will be perceived by the larger society (Csikszentmihalyi, 1988).

Individual traits, while very important to the creative process, may be viewed as a necessary, but not a sufficient, explanation of high level creativity. Social and cultural forces shape individual expressions of creativity. Fields and domains act as filtering devices to select innovations that will be valued. Other potential innovations will be ignored or even treated as deviant (Csikszentmihalyi, 1990). Specific domains or subspecialties have unique disciplinary cultures and characteristics that include specific procedures, practices, activities, and boundaries. Individuals, who bring their own levels of competence, backgrounds, energy, motivation, leadership skills, and creativity, both work within the existing boundaries of a domain, and seek to produce novelties that solve problems within a domain (Csikszentmihalyi, 1990).
According to Csikszentmihalyi (1988), timing in the production of creative works is important. Novelties produced are frequently not defined as creative immediately, but are contingent upon the changing perceptions of the collective will of representatives of fields who shape the definition of what is considered creative in a given subspecialty (Csikszentmihalyi, 1988). Within some fields such as mathematics and physics, creative advances may be more easily recognized due to greater objectivity in recognizing what truly represents a creative breakthrough. In other areas, such as in the social sciences and humanities, evaluation of creative breakthroughs are more subjective, and thus, difficult for society and disciplinary actors to reach agreement on what they represent (Csikszentmihalyi, 1988).

Individual disciplinary cultures have many devices that serve as mechanisms for promoting and shaping creative behavior and determining the limits of innovativeness. The tenure system, educational and professional associations, and institutional expectations for teaching and research help shape faculty behaviors. Collective representatives within a broad disciplinary field or narrow subspecialty accept or reject a given novelty. Within an academic context, acceptance or rejection of a given novelty can be reflected in publication opportunities, availability of sponsored research funding, and in opportunities for collaboration with other faculty or with business partners.

Availability of sponsored research funding, and partnerships with business can have a strong impact on choice of topics, due to the likelihood of obtaining funding in a given area, which may lead to a deeper understanding of that area. Resource availability reflects the will of various segments of society who have the power to help shape the
types of projects that are undertaken by faculty. For example, currently, within science, genetics and brain research appear to be topics that are favored by government agencies and the medical industry, and are therefore more readily funded (Wilson, 1998). The shaping of academic research agendas today by various funding sources is analogous to the influence of wealthy patrons on the visual arts within such cities as Florence during the Renaissance (Csikszentmihalyi, 1988).

Blackburn and Lawrence (1995) described a theoretical framework they developed to describe faculty role performance and achievement. This framework was useful to the researcher in considering the entrepreneurial and creative behaviors of professors. Like the other models from creativity and from a business context, this framework emphasized the complex and interacting environmental influences upon individual behavior. They suggested their theory “integrates the research on faculty role performance and productivity with motivation theories” (Blackburn & Lawrence, 1995).

In describing their theoretical approach they maintained:

academic institutions are achievement laden environments in which the evaluation of faculty, student, and administrator performance is ongoing...Faculty use assessments of themselves and their social contexts to make meaningful decisions about their actions...Experience over time leads individuals to modify their understanding of their work environments as well as their self-images. These changes can affect the subjective incentive value of different facets of work, and consequently a faculty member’s level of engagement in different activities can shift...Some types of self-referent thought and perceptions of the work environment are fairly enduring, whereas others change frequently on the basis of personal feedback and vicarious experience. (p. 26)

Key elements of Blackburn and Lawrence’s conceptual framework included individual faculty career, socio-demographic characteristics, self-knowledge, social-knowledge, environmental conditions, environmental responses, behaviors, social
contingencies, and work products. This framework suggested that professor's social knowledge and self-knowledge are important in determining behaviors that lead to products such as scholarly research leading to publications, grant productivity, and service roles. Environmental conditions provide professors with cues concerning standards of behaviors.

Unit of Analysis

The primary unit of analysis for this exploratory multiple case study research was the individual academic entrepreneur in the context of his or her academic unit and institution. An important aspect of this research was how individual academic entrepreneurs, representing different broad knowledge areas, negotiate and shape their work environments, thus creating or taking advantage of optimal conditions, and minimizing obstacles that may inhibit their work. Since the context for academic entrepreneurship, including primary academic unit and institution, is so important, the individual cases were embedded within three broad knowledge areas of the arts and sciences division; natural sciences, social sciences and humanities of a doctoral/research institution. Overall, three levels of cases were analyzed. The first case level was the individual experiences of seventeen academic entrepreneurs. The second level of case included an analysis comparing and contrasting the experiences of the academic entrepreneurs within the three broad knowledge areas, social sciences, arts and humanities, and natural sciences. The third, and broadest case level, was the arts and sciences division. This level of analysis identified potential common aspects among all or most of academic entrepreneurs within the arts and sciences division. Concerning the unit of analysis for the study, it is appropriate to reference the individual academic entrepreneurs and three knowledge areas within arts and sciences as representing mini-
cases. These mini-cases, about which the researcher collected substantial, but not exhaustive, information, were embedded in the larger case of the arts and sciences division of the study institution. The individual or mini-cases represented a sample group of arts and sciences academic entrepreneurs of the study institution.

The time boundary for these cases was the period of time during which data was collected, primarily July, 2001 to March, 2002. Since individuals and organizations are dynamic, it is appropriate to reference a specific time frame during which these cases were considered. However, the individual experiences of the academic entrepreneurs interviewed for this research represented an accumulation of behaviors developed over a lifetime. Therefore, observations concerning individual entrepreneurs, while heavily focused on the present and recent past work experiences, included experiences outside of the present or recent past. Similarly, organizational climate-related analysis focused on the present and recent past, but drew from observations concerning academic unit and institutional cultural influences that evolved over a period of many years.

Definitions of Key Terms

Definitions of terms that are important to this study are presented below. The literature review section of this study includes discussion and expanded definitions of some of these terms. The key terms are entrepreneurship, entrepreneur, entrepreneurial behavior, creativity, creative environment, innovation, entrepreneurial creativity, and academic entrepreneur(ship).
Many definitions of entrepreneurship, and the associated terms such as entrepreneur, and entrepreneurial behaviors, are presented in the literature. Bird (1989) in synthesizing definitions of entrepreneurship, suggested three definitions:

1) “Entrepreneurship is the creation of value through the creation of organization
2) Entrepreneurship is the process of starting and/or growing a new profit-making business”.... 3) Entrepreneurship is the process of providing a new product or service” (Bird, 1989, pp. 2, 5,6). She asserted that the process of entrepreneurship involves “conceiving, creating, organizing, promoting, and implementing a new organization” (Bird, 1989, p. 2). Schumpeter's definition of entrepreneurship referenced new combinations of production and innovativeness. He suggested that entrepreneurship involves introduction of a new economic good or service; introduction of a new production method; opening of a new market; conquest of a new source of raw materials; and reorganization of an industry such as the creation or breaking up of a monopoly (Schumpeter, 1934).

Solomon (1985) defined the entrepreneur “as an innovative person who creates something different with value (added) by devoting time and effort, assuming the financial, psychological, and social risks... in an action oriented perspective... and receiving the resulting rewards (and punishments) of monetary and personal satisfaction” (Solomon, 1985, cited in Solomon & Winslow, 1993, p. 203). Solomon and Winslow (1993) suggested that an entrepreneur is “one who starts and is successful in a venture and/or project that leads to profit (monetary or personal) or benefits society” (Solomon & Winslow, 1993, p. 203-204).
In general, entrepreneurial behavior is a term that is used to describe common behaviors of individuals who assume the role of an entrepreneur. Bird defined *entrepreneurial behavior* as "opportunistic, value-driven, risk-accepting, creative activity where ideas take the form of organizational birth, growth, and transformation" (Bird, 1989, p. 5-6). Although many definitions of entrepreneurship and associated terms, such as entrepreneur and entrepreneurial behavior, are firmly rooted in the activities of individuals who start and operate a business, entrepreneurship frequently refers to behaviors in an individual or organizational context that are closely associated with innovation, invention, discovery, and creativity (e.g. Amabile 1988, 1996, 1997; Bird, 1989, Drucker, 1993).

Like entrepreneurship, *creativity* is a multi-faceted field of study that is not simple to define (Torrance, 1988). According to Mooney (1963), creativity can be studied from the perspective of environment, product, process, and person (Taylor, 1988 citing Mooney, 1963). Definitions for one perspective may not necessarily capture the essence of creativity from other perspectives. Amabile asserted "creativity is the production of novel and useful ideas by an individual or small group of individuals working together" (Amabile, 1988, p. 126). She suggested "a product or response will be judged as creative to the extent that (a) it is both novel and appropriate, useful, correct or valuable response to the task at hand, and (b) the task is heuristic rather than algorithmic" (Amabile, 1996, p. 35). She distinguished algorithmic tasks from heuristic tasks by describing algorithmic tasks as "tasks for which the path to the solution is clear and straightforward -- tasks for which an algorithm exists. By contrast, heuristic tasks are
those tasks not having a clear and recognizable solution -- tasks for which algorithms must be developed" (Amabile, 1996, p. 35).

Some approaches to creativity, such as the dynamic systems model of creativity advanced by Csikszentmihalyi (1988, 1990, 1996), Gruber (1988, 1999) and others, recognized the necessity of viewing the creative process from multiple perspectives, including person, characteristics of a knowledge domain, and representatives of a field of knowledge. In describing his systems model of creativity, Csikszentmihalyi stated "creativity results from the interaction of a system composed of three elements: a culture that contains symbolic rules, a person who brings novelty into the symbolic domain, and a field of experts who recognize and validate the innovation. All three are necessary for the creative idea, product, or discovery to take place" (Csikszentmihalyi, 1996, p. 6). He suggested "creativity occurs when a person, using the symbols of a given domain such as music, engineering, business or mathematics, has a new idea or sees a new pattern, and when this novelty is selected by the appropriate field for inclusion into the relevant domain" (Csikszentmihalyi, 1996, p. 28). This dynamic systems view of creativity is important to the study and was adapted for use in describing academic entrepreneurship.

An important aspect of the study was understanding conditions that promote or hinder the creative process, and particularly, understanding how entrepreneurial behaviors may be associated with optimal work performance. Therefore, understanding environments that may hinder or enhance the creative process is important. Harrington (1999) defined creative environments as "the physical, social, and cultural environment in which creative activity occurs. Creative environments may involve nested
environments, for example, a research laboratory nested within a research institute, nested within a university, nested within a particular state or nation, nested within a particular time in history” (Harrington, 1999, p. 323). He maintained a creative environment is one of three basic elements of a creative ecosystem. Harrington suggested the three elements of a creative ecosystem include “the centrally involved creative person(s), the creative project, and the creative environment, as well as the functional relationships that connect them” (Harrington, 1999, p. 323).

*Innovation* refers to novelty with respect to processes and products. It is frequently distinguished from creativity in that innovation reflects an implementation of or use of creative products, ideas, processes, and products. Kanter (1983) suggested innovation is “the process of bringing any new, problem-solving idea into use … Innovation is the generation, acceptance, and implementation of new ideas, processes, products or services” (Kanter 1983 in Amabile, 1988, p. 126). Amabile asserted that many definitions of innovation include an aspect of bringing novel ideas into use by a larger group (Amabile, 1988). Innovation also commonly refers to applying ideas, although not necessarily unique, to different settings. Arad, Hansen, and Scheider (1997) made the distinction that creativity researchers frequently study processes and products of individuals, whereas innovation frequently refers to the process of bringing novel ideas into use. Arad et al. citing Amabile (1988) suggested that creative ideas are building blocks of organizational innovation, and innovation reflects successful implementation of creative ideas.
The term *entrepreneurial creativity* represents a connection of ideas associated with entrepreneurship, innovation, and creativity. Amabile suggested that entrepreneurial creativity is "the generation of novel and appropriate ideas to establish a new venture (a new business or new program to deliver products and services). The primary, novel, useful ideas may concern: (a) the products or services themselves, (b) identifying a market for the products and services, (c) ways of producing or delivering the products or services, or (d) ways of obtaining resources to produce or deliver the products or services" (Amabile, 1997, p. 20). She asserted that entrepreneurship "requires action or the implementation of innovative ideas -- invention put into action" (Amabile, 1997, p. 20). Bird (1989) also used the term entrepreneurial creativity. She suggested that there is empirical evidence from studies of entrepreneurs that they "tend to have some of the characteristics of creative personalities... and that entrepreneurs tend to need and value creative expression" (Bird, 1989, p. 51).

Louis, Blumenthal, Gluck, and Stoto (1989) describe *academic entrepreneurship* "as the attempt to increase individual or institutional profit or prestige through the development and marketing of research ideas or research-based products" (Louis et al., 1989, p. 110). Individual academic entrepreneurs may engage in five basic forms of academic entrepreneurship. The forms are "1) large scale science (externally funded research), 2) earning supplemental income, 3) gaining industry support for university research, 4) obtaining patents or generating trade secrets, and 5) commercialization -- forming or holding equity in private companies based on a faculty member's own research" (Louis et al., 1989, p. 11). Bird, without explicitly defining academic entrepreneurship in her studies of academic entrepreneurs, links academic entrepreneurship and commercialization of faculty intellectual property. She discusses
topics such as consulting with business and industry, formal research agreements with business and industry, and faculty start-up businesses in the context of academic entrepreneurship (Bird, 1989).

Slaughter and Leslie (1997) considered and rejected using the term academic entrepreneurship. They viewed the terms academic entrepreneurship or entreprenuerism as “euphemisms for academic capitalism which failed to fully capture the encroachment of the profit motive into the academy” (Slaughter & Leslie, 1997, p. 9). They preferred to use the term academic capitalism to refer to activities of individuals and institutions that could also be described as academic entrepreneurship. For Slaughter and Leslie, academic capitalism referred to “institutional and professorial market or marketlike efforts to secure external moneys” (Slaughter & Leslie, 1997, p. 8). They referenced attempts to maintain or expand resources as being “variously referred to as applied, commercial, strategic, and targeted research, whether these monies were in the form of research grants and contracts, service contracts, partnerships with industry and government, technology transfer, or the recruitment of more and higher fee-paying students” (Slaughter & Leslie, 1997, p. 8).

Overall, the scholars whose work the researcher reviewed considered academic entrepreneurship narrowly within the context of relations with business and industry or in some way starting a business (e.g. Bird and Allen, 1989; Bird, Allen, & Hayward, 1993; Fairweather, 1989; Louis et al. 1989; Slaughter & Leslie, 1997). Scholars writing about academic entrepreneurship appear to focus most closely on the business context related to starting a business organization, or associating with business, industry and government
rather, than considering academic entrepreneurship in a context that could be described as a "spirit of entrepreneurship" that is often associated with creative individuals, and in particular with entrepreneurs who frequently exhibit a creative working style.

While entrepreneurship encompasses a range of behaviors by individuals within nearly any organizational context, empirical studies of academic entrepreneurship focus on activities that have a business orientation. However, informally, anecdotally, and possibly in the popular higher education press, there may be an expanded view of the academic entrepreneur that includes attributes associated with creative individuals in negotiating and shaping their work environments, not only pursuing activities that have some relation to business and industry, but in a general operating style or in engaging in activities that may be unconventional for them individually or within their disciplinary or institutional context. This informal view relating to entrepreneurial behaviors appears more consistent with the popularization of the phenomenon of entrepreneurship that includes any organizational context and importantly behaviors associated with creativity and innovation within established organizations as well as the starting of a new organization. The researcher's operational definition for this study, described below, includes both the common and expanded view of academic entrepreneurship.

Operational Definition of Academic Entrepreneurship

The research problem, conceptual model, literature review, and research questions involved viewing the topic of academic entrepreneurship from multiple perspectives, including individual and organizational entrepreneurship, innovation, and creativity, rather than exclusively from a perspective of academic entrepreneurship that primarily emphasizes faculty starting and operating businesses, or transferring intellectual property.
to business and industry, and earning consulting income. Therefore, a multi-faceted operational definition of academic entrepreneurship was appropriate. Consistent with the exploratory case study methodology that the researcher used for this research, and acknowledging that the expanded definition of academic entrepreneurship may involve a working style that may be associated with individuals expressing high levels of personal productivity and personal creativity, the operational definition includes elements relating to the common view of academic entrepreneurship, as well as elements that may be more frequently associated with an informal perception of entrepreneurship, especially aspects relating to a working style that may be described as entrepreneurial and creative. Since the operational definition was used to help identify nominated entrepreneurs, it was appropriate that the definition presented in this section has some specificity in order to increase the likelihood of identifying individuals who may reflect some of the behaviors the researcher was interested in examining. Simultaneously, however, the operational definition of academic entrepreneurship reflected some degree of flexibility or generalness to enable the researcher to explore the topic from an expanded perspective that includes entrepreneurial and creative working styles.

Entrepreneurial creativity, defined in the previous section, (e.g. Amabile, 1997) usefully describes the characteristics that the researcher was interested in examining in this study. For those faculty who were identified as being entrepreneurially creative in their working style, the researcher was interested in finding what aspects of their working conditions served to advance their work and what aspects hindered their work. For those aspects that may hinder their work, the researcher was interested in knowing what faculty may do to minimize the impact of negative influences. The higher education
entrepreneurs the researcher was interested in studying were those individuals who are identified by their unique, unconventional or creative working style, rather than simply those who engage in a narrowly defined set of behaviors such as patents, starting a business, or consulting, although those activities, as well as others, may represent manifestations of unique or creative working styles of faculty. The expanded view of academic entrepreneurship may also include quantity and quality of academic productivity and engagement in multiple categories of behaviors referenced as academic entrepreneurship.

Typical behavioral expressions of entrepreneurship among faculty that the researcher anticipated finding among study participants included active engagement in consulting, developing centers, institutes or other programs, interest in and/or success in obtaining patents and licensing ideas, starting and operating a business, and consistent success in obtaining resources through grants and contracts with government agencies, business, foundations, and other organizations, as well as development of or early adoption of unique teaching methodology. Viewed as individual activities, many of those activities may appear to be very standard practices within a university context, and thus not necessarily entrepreneurial. However, when considering faculty who participate in many of those activities simultaneously or participate in activities that are not typical for their academic unit or disciplinary domain, the behaviors may begin to be categorized as entrepreneurial. Thus, a further important attribute is a demonstrated record of academic productivity, both quality and quantity, that is consistently above departmental and disciplinary norms.
Adding the subjective criterion of quality and quantity of academic productivity consistently above disciplinary norms and an entrepreneurial working style to the operational definition of academic entrepreneurship, establishes that, for this study, conceptualization of an academic entrepreneur refers to both activities that are traditionally viewed as entrepreneurial such as business creation and licensing of intellectual property, as well as a broader definition of academic entrepreneurship such as highly productive faculty in multiple areas and/or a working style associated with entrepreneurship, innovation, and creativity. Closely related synonyms for academic entrepreneurs in the context of this study include faculty stars, faculty vitality, productive faculty, and innovative faculty.

Recognizing the value of a concise operational definition for the purposes of this study that captures many of the elements described above, the researcher used the following definition of academic entrepreneurship: Academic entrepreneurship refers to a creative, innovative, and entrepreneurial working style by individual faculty members that may be characterized by behaviors associated with unconventionality, opportunism, sensitivity to internal and external audiences, flexibility, action-orientation, as well as productivity, both quantity and quality, in research, teaching, and/or service, that is above departmental and/or disciplinary norms. Manifestations of academic entrepreneurship may include, but not be limited to, activities such as extensive consulting with organizations, establishing organizational units, commercializing ideas through patents, licensing, copyrights, and royalty income; starting a business; extensive grants and contracts work; extensive cross-disciplinary collaboration; and developing and/or early adoption of novel instructional technologies.
Problem

Academic entrepreneurship is a multi-dimensional topic of current debate, concern, and controversy within higher education. Academic entrepreneurship is a visible characteristic of the changing professorate. Fiscal constraints, changing expectations of faculty, expansion in the availability of different types of teaching and research tools, and modified organizational structures may all lead to increased emphasis on entrepreneurial behavior among faculty. Clark has suggested that entrepreneurial activity in some contexts is of such magnitude and importance within higher education that it has moved from the periphery to the core of higher education (Clark, 1993 in Witrock & Rothblatt, 1993). A statement by Stanley O. Ikenberry, President of American Council on Education at that organization’s annual meeting, helps illustrate why academic entrepreneurship is a legitimate topic of study. In discussing the current state of American higher education, Ikenberry stated, “some faculty members live dual lives, one as professor and one as entrepreneur-CEO, one as mentor and the other as employer. They and we struggle with the inevitable questions of conflict of interest and commitment and the changes to academic culture that results” (Ikenberry, 2001).

For some scholars and practitioners of higher education, extensive engagement in aspects of academic entrepreneurship represents a valuable and complementary opportunity for faculty to produce and transmit knowledge and, thus, they should be encouraged. Proponents of some aspects of academic entrepreneurship encourage entrepreneurial behaviors as a valuable way of creating knowledge, advancing student learning, and maintaining or improving faculty morale. Critics of academic entrepreneurship may view certain entrepreneurial aspects as a threat to traditional
approaches to higher education, and as such, would like to see entrepreneurial behaviors limited or controlled.

Some aspects of an entrepreneurial working style may be less controversial than certain entrepreneurial products. For example, it is unlikely that a working style of a professor who is energetic and performs well in multiple areas would generate substantial controversy. Similarly, frequent and substantial sponsored research success may not generate controversy. However, neglecting some academic duties in order to consult or operate a business can and does spark controversy within American higher education. In some disciplinary areas, especially in professional schools and applied fields, entrepreneurial activities are common and may be well-accepted. In other areas, such as some areas of arts and sciences, entrepreneurial behaviors may occur less frequently, and generate controversy. Understanding controversies associated with academic entrepreneurship are complicated by the complexities associated with determining what may fall under the umbrella as meriting the label of entrepreneurial behaviors. Are the behaviors simply those that are typically associated with a relationship to business and industry or can academic entrepreneurship include an informal set of behaviors that may reflect multiple behaviors in multiple areas that closely resemble a working style related to creativity and innovation? Or, are professorial working styles more appropriately described in literature relating to faculty productivity or in some other area? Understanding issues relating to appropriate boundaries of the topic of academic entrepreneurship can help make distinctions concerning applications of terminology relating to entrepreneurship in the higher education context.
Purpose

In order to understand academic entrepreneurship and its implications, especially for individual faculty members, it is valuable to understand the climates that promote or inhibit entrepreneurship as well as how highly entrepreneurial faculty negotiate and shape their environments. Research in this topical area can provide insights concerning intentional or unintentional workplace barriers to creativity, innovation, and entrepreneurship within higher education institution academic units. Despite the elusiveness in obtaining optimal conditions for entrepreneurial behaviors within dynamic institutions and academic units, the insights of entrepreneurial professors obtained through a questionnaire and interview responses concerning what they do to shape their environments can help inform deans, department chairs and other institutional leaders of the conditions and support professors need in order to be highly productive. Insights concerning influences upon academic entrepreneurship may contribute to an understanding of why some individuals are more likely to be successful as academic entrepreneurs, and why it may be appropriate for differential expectations for entrepreneurial behaviors across disciplines. Overall, this study may contribute to a greater understanding of the complexity of academic entrepreneurship, and the implications for higher education in accommodating a variety of entrepreneurial behaviors.

Research Questions

1. What are the characteristics of academic work climates that promote or inhibit entrepreneurial behaviors?
2. What are the key facilitators and barriers to engagement in entrepreneurial behaviors by faculty at a selective doctoral/research university?

3. How do highly entrepreneurial faculty negotiate and shape their environments to create conditions that enhance their work performance?

4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain?

Significance of the Study

This study advances an understanding of the unique working styles of academic entrepreneurs, and how they shape their environments within the arts and sciences division at an American doctoral/research university. The study presents detailed individual case studies that confirm the importance of considering the context for entrepreneurship, including characteristics of knowledge domains in understanding academic entrepreneurship. It also builds upon a literature base pertaining to what individual and environmental factors are likely to result in optimal creative and entrepreneurial output. The study may contribute to whether the expanded definition of academic entrepreneurship used in the study is novel, useful and appropriate. This contribution would be indirect since the research questions are not structured to specifically examine that issue.
The presentation of a conceptual framework and model adapted from scholars of creativity, business entrepreneurship, and higher education entrepreneurship in describing a complex phenomenon that is expressed through interactions of the individual, domains and fields, and academic cultures could be used by researchers to explore related topics.

Limitations of the Study

The case study data for this study are not generalizable to other samples of professors at this or any other institution. The findings apply only to professors included in the study. The qualitative case study approach utilized sample selection procedures and data analysis procedures that did not include a random sampling process or data analysis utilizing inferential statistics.

The nomination process to identify study participants for this primarily qualitative study represented a purposeful sampling technique. Comparisons of nominated entrepreneurs to individuals who were not nominated were not made. Accordingly, the researcher cannot state how nominated entrepreneurs differ from individuals not readily nominated as an entrepreneur. Random sampling and inferential statistics were not part of the study methodology. The themes emerging from the study are not generalizable to a larger population. Professors from different knowledge areas share common attributes, and express working styles that may evolve over time and depend on current conditions and interests. However, since the study utilized a conceptual framework, and with a structured research design that included detailed documentation of the nomination process, data collection and data analysis procedures, the themes could be explored using a similar research methodology involving different types of institutions, academic
departments and disciplines. The interview questions and data obtained from the responses could be used in identifying questions that could be examined in a quantitative study of academic entrepreneurs.

Primary difficulties of the study related to decisions that were made in operationalizing the data collection. A desire to move forward with the study after an initial data source would not participate in the way the researcher planned, led to difficult data collection decisions. The pilot study institution became the primary source of data. That institution was a rich source of data. The institution has a reputation of emphasizing teaching excellence. A greater research culture has been emerging in recent years. The tension caused by balancing teaching emphasis and research excellence and productivity contributed to making the study institution an interesting choice of study institution. While all of the pilot study participants agreed to participate, not all of the participants provided all of the information requested. Since the researcher needed to conclude the data collection process, data analysis proceeded without reviewing exactly the same information for all participants. The researcher became concerned that repeated requests for information would cause some participants to withdraw from the study.

The data analysis process was an iterative one. Categorization of data points forced the researcher to make many reviews of data points, and provided greater assurance that the themes presented accurately characterized the data. Difficult judgments had to be made concerning categorization of data. Some points could have been categorized differently, given the complexity and at times contradictory statements made by participants. Themes were based on organizing participant responses on topics
in which they may have provided different levels of depth. Topics that professors discussed in detail were easy to categorize. Other topics may have only received a brief mention, providing less assurance of how to categorize the response. However, the statements of professors made in context and reported in the cases are helpful in reinforcing the accuracy of the themes that emerged from data analysis.

The complexity and diversity of the disciplines represented, and the complexity of professors, made cross-case analysis and determining distinctions among broad knowledge areas difficult. Greater balance among total numbers of participants for each broad knowledge area could have helped in the process of making distinctions among the broad areas. Although the researcher attempted to make distinctions among the three broad knowledge areas, the uniqueness of the disciplines and individuals represented made it difficult to identify common areas within a knowledge area that could be contrasted with the other two knowledge areas. The arts and humanities area only included four participants. Those individuals represented interesting disciplines. However, the perspectives concerning the entrepreneurial and creative working styles of an artist, another music professor, and a creative writer could have made the distinctions among broad knowledge areas sharper. It was difficult for the researcher to assert, with confidence, some of the knowledge area distinctions. However, as the data tables and discussion of themes reveals, on many categories of information identified as important to the study, there were consistent responses among most study participants.

In reporting findings, the researcher balanced respect for study participants and the study institution with researcher independence. Attempts were made to develop
appropriate rapport and trust with professors. Concerns about anonymity and how the data would be reported may have been important to some study participants, and not to other participants. The extent to which professors spoke honestly and openly concerning their working style and conditions that influenced their behaviors is unknown. The researcher attempted to accurately report statements from cases in the context in which they were made. Extensive review of data points and the presentation of cases minimized the possibility of errors in interpreting the data.

Delimitations

Decisions were made concerning study delimitations. Seventeen faculty members identified as entrepreneurial within three areas of the division of arts and sciences at one American Carnegie Classification doctoral/research intensive university represents the purposeful sample. The study institution represents an institution type in which professors expressing entrepreneurial working styles were likely to be easily identified. The researcher was aware that the study institution represented an institution that has a tradition of valuing teaching excellence, and is one in which there is a general trend toward greater emphasis on research for faculty, creating some tension relating to preservation of traditional academic values, and changing departmental and institutional values.

The academic entrepreneurs interviewed for this study included eight professors from social sciences, four professors from arts and humanities, and five professors from natural sciences. The numbers of fields or discipline areas represented within the three knowledge areas were not equal. A limited amount of data for each of the study participants was collected including a questionnaire, single interview, and curriculum
vitae. Since this case study methodology utilized multiple cases, and is instrumental rather than intrinsic, this amount of data for each individual is appropriate in identifying themes that reveal insights concerning entrepreneurial behaviors.

Faculty of Arts and Sciences was chosen, in part, because the researcher believed the diversity of knowledge areas within that division would provide useful insights concerning both the similarities and differences in entrepreneurial behaviors and working styles within both similar knowledge groupings and in very different knowledge areas. The division was also chosen to obtain insights concerning entrepreneurial behaviors in knowledge areas with less well-established reputations for entrepreneurial behaviors as opposed to applied fields such as business and engineering where certain behaviors commonly referred to as entrepreneurial may be well established.

Statistical analysis of surveys directed to large numbers of scientists is the common way the topic of academic entrepreneurship has been studied. While the researcher considered directing a survey to a randomly selected number of professors, the topic of working styles of entrepreneurial professors and work climates that enhance or inhibit their work, and the complexity of the conceptual framework pointed in the direction of a small purposeful sample analyzed according to research techniques associated with qualitative methodology.
The behaviors and working styles of academic entrepreneurs are developed over the course of a career. Perceptions concerning the departmental and institutional climate for entrepreneurship is dynamic. For this study, perceptions of the organizational climate for organizational and departmental context are based primarily upon perceptions relating to conditions during the data collection period and the very recent past.
CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

The major areas of literature reviewed to understand the topic of barriers and enhancements to academic entrepreneurship in general, and the strategies academic entrepreneurs may use to shape and negotiate their environments in particular, include: 1) the business context for entrepreneurship with emphasis on personal characteristics of entrepreneurs, 2) the academic context for entrepreneurship, including associated topics such as academic capitalism, technology transfer, faculty consulting, as well as scholarly writings concerning trends in higher education generally and the changing professorate in particular, and 3) concepts associated with promotion of innovation and creativity within individuals and organizations. Each area has contributed to the researcher's understanding of the influences upon the behaviors of academic entrepreneurs.

Concepts of Entrepreneurship: Business and Other Organizational Contexts

The word entrepreneur is French and literally means between-taker or go-between (Ronstadt, 1985). During the Middle Ages the term referred to an individual in charge of large scale projects such as cathedrals. During the early 18th century in France, the term became associated with risk-bearing and referred to farmers who planted crops without any certainty of an eventual harvest (Bird, 1989 citing Hebert & Link, 1982). Say, a French economist, popularized the concept during the early 19th century. He intended the word to reflect individuals who disrupt and disorganize. Say saw change as healthy and vital for the economy. An integral component of the entrepreneur described by Say
is that of doing something different rather than doing more of the same thing (Drucker, 1993).

Schumpeter's definition of entrepreneurship referenced new combinations of production and innovativeness. He identified five different types of entrepreneurial activity including introduction of a new economic good or service, introduction of a new production method, opening of a new market, conquest of a new source of raw materials, and reorganization of an industry such as the creation or breaking up of a monopoly (Schumpeter, 1934, 1947). He asserted “entrepreneurship... consists of doing things that are not generally done in the ordinary course of business routine, it is essentially a phenomenon that comes under the wider aspect of leadership” (Gartner, 1988, p. 18, citing Schumpeter, 1934). Schumpeter is noted for emphasizing innovativeness as a part of entrepreneurial activity. Recent definitions of entrepreneurship also frequently include an aspect of innovativeness. Innovativeness is frequently described as a new way of looking at old problems (Drucker, 1993). Entrepreneurs are associated with recognizing opportunities for bringing about a change and seeking to capitalize on the opportunity. Bird suggested that a definition of entrepreneurship is "the process of providing a new product or service" (Bird, 1989, p. 4).

A common use of the terms “entrepreneur” and “entrepreneurship” is starting and managing a business for the purpose of making a profit (e.g. Bird, 1989; Casson, 1982, 1990; Gilder, 1984). Within this broad business-oriented description of entrepreneurship, frequently there is not a distinction between the characteristics or type of business that is started and nurtured. Drucker (1993), however, asserted that every new small business is
not entrepreneurial. For example, opening another location of the corner grocery or fast
food franchise does not satisfy the test of an entrepreneurial activity that includes
innovativeness and the creation of new markets (Drucker, 1993).

Entrepreneurship has evolved from essentially a phenomenon relating to starting a
new business to one relating to establishment of any type of organization. Importantly,
entrepreneurship now commonly applies to entrepreneurial behaviors frequently
associated with innovation within the context of well-established organizations of any
type. Sometimes entrepreneurial behaviors within well-established corporations and
other types of organizations without the intent of starting a new organization or leaving
their employer is referred to as intrapreneurship (Oden, 1997; Pinchot, 1985).
Entrepreneurial behaviors are described as existing within organizations such as post
secondary education, government agencies, hospitals, social service agencies, K-12
schools and community groups. Institutions of higher education receive attention as
places in which entrepreneurial behavior can thrive at the individual, departmental and
institutional level. Evidence of an expanded conceptualization of entrepreneurship to
include higher education, is present in Drucker’s assertion that the history of American
higher education represents a strong metaphor for entrepreneurship, given the
adaptability and nurturing of innovative ideas that has marked the evolution of higher
education in America (Drucker, 1993).

The field of entrepreneurship is an important sub-specialty within business
schools within higher education, and is of interest to scholars in areas relating to
organizational development and behavior, public administration, psychology, sociology,
and creativity. Popular and scholarly literature is devoted to describing the attributes of successful entrepreneurs, strategies for successful initiation of a business, and for cultivating an entrepreneurial climate within organizations. Case studies of successful entrepreneurs are frequently used to illustrate common working style attributes.

Empirical studies regarding entrepreneurship in a business context often reach different and sometimes conflicting conclusions concerning personal characteristics of entrepreneurs. Some studies of entrepreneurs reflect findings that are inconclusive concerning dominant personality characteristics. Timmons (1989) suggested that all research-supported characteristics do not have to exist within any one person for that individual to be successful as an entrepreneur. Stevenson and Gumpert (1985) maintained that entrepreneurship is not an all or none trait, and that “individuals fall within a spectrum of managerial behaviors. At one end is the entrepreneur and at the other is the consummate bureaucrat” (Stevenson & Gumpert, 1985 cited in Winslow & Solomon, 1990, p. 204).

For these reasons, some recent researchers (e.g. Gartner, 1988; Johnson, 1990) suggested individual attributes as providing only a partial description of entrepreneurship, and have shifted their focus to a broader view of entrepreneurship. According to Gartner, a useful framework for understanding entrepreneurship “integrates four major perspectives in entrepreneurship: characteristics of the individual who starts the venture, the organization which they create, the environment surrounding the new venture, and the process by which the new venture is started” (Gartner, 1985, p. 696). In that regard, personality traits for successful entrepreneurship may be situational, and contextual.
Shaver and Scott (1991) argued that entrepreneurial behaviors need to be understood from multiple perspectives, including a personological perspective. They asserted:

through the years, more and more of these personological characteristics have been discarded, debunked, or at the very least, found to have been measured ineffectively. The result has been to concentrate on almost anything other than the individual. Economic circumstances are important; social networks are important; entrepreneurial teams are important; even public agency assistance is important. But none of these will alone, create a new venture. For that we need a person, in whose mind all of the possibilities come together, who believes that innovation is possible, and who has the motivation to persist until the job is done. (p. 31)

Within the context of debate within the field of entrepreneurship concerning personality traits or common behaviors of entrepreneurs, selecting common attributes of business entrepreneurs, and testing whether those attributes are evident in academic entrepreneurs is challenging. Notwithstanding the unsettled nature of findings regarding personality attributes or behavioral characteristics of entrepreneurs, there are some attributes or behavioral characteristics that are commonly associated with entrepreneurs. These attributes, whether or not confirmed in the literature or necessarily applicable to academic entrepreneurs, nevertheless may contribute to popularly held impressions of personal attributes and common behaviors of individuals labeled as entrepreneurial in many different organizational contexts. A few attributes commonly associated with successful entrepreneurs are described below. These attributes are not suggested as definitive attributes of entrepreneurs in a business, academic context, or any other organizational context.
Common Attributes and Behaviors of Entrepreneurs

Many researchers (e.g. Amabile, 1996; Bird, 1989; Engle, Mah & Sadri, 1997) referenced creativity as an important attribute of entrepreneurs. For example, Engle et al. maintained that "the entrepreneur is a creative thinker, modifying or rejecting previously accepted ideas to build innovations from practically anything" (Engle et al., 1997, p. 45). Bird suggested that "entrepreneurs tend to need and value creative expression" (Bird, 1989, p. 51). She asserted "in the business world, few individuals appear to demonstrate as much generativity -- creating new products, new processes, new markets and new organizations. A complete understanding of entrepreneurship cannot be had without considering its creative aspects, centering on the individual or team that intends this outcome" (Bird, 1989, p. 55, 56). Bird suggested that entrepreneurs are able to overcome barriers to creativity (Bird, 1989, citing Adams, 1980).

Successful entrepreneurs are frequently associated with high energy and vitality (e.g. McClelland, 1987; Timmons, 1989). Studies also have suggested that entrepreneurs are commonly associated with opportunism and action orientation. They are frequently described as focused and goal-oriented. (e.g. Bird, 1989; McClelland, 1987; Swayne & Tucker, 1973 cited in Bird, 1989; Timmons, 1989). Entrepreneurs may prefer to set challenging goals and have reputations for working with purpose, persistence and tenacity to reach their goals. The goals they set may require a stretch to reach. Researchers have conducted studies concluding that entrepreneurs frequently exhibit characteristics associated with a high need for achievement (e.g. McClelland, 1987).
Studies of entrepreneurs suggest that they do not recklessly pursue challenging tasks. They appear to be pragmatic in setting goals that are challenging to reach but not so difficult to reach that likelihood of failure is great (e.g. McClelland, 1987). Winslow and Solomon (1993) suggested that “entrepreneurs have the ability to adjust to difficult situations that have not been predicted” (p. 79), but that their flexibility should not be “confused with randomness of behavior. Successful entrepreneurs have the ability to plan and plan well, but also exhibit creativity in adjusting to and developing alternative solutions to unexpected consequences” (Winslow & Solomon, 1993, p. 79).

The topic of the level of risk-taking assumed by entrepreneurs is controversial within the entrepreneurship literature. Assuming risk, including debt, bankruptcy, and business failure are potential hazards of starting a business. Thus, some degree of risk is inherent in a business context for entrepreneurship. Entrepreneurs may assume risks, but with careful planning, and implementation strategies, they take precautions that help them minimize or transfer risks (e.g. McClelland, 1987; Mitton, 1989; Timmons, 1989). In this regard entrepreneurs are referred to frequently as calculated risk-takers. Timmons suggested that resiliency in overcoming obstacles is associated with entrepreneurial behaviors (Timmons, 1989).

Both extrinsic and intrinsic factors may motivate entrepreneurs (McClelland, 1987). Undeniably, within the for-profit sector, the possibility of substantial profits may attract and sustain the work of entrepreneurs. Extrinsic motivating factors such as those associated with financial gain may reflect only one of many motivating factors for entrepreneurs (Bird, 1989). The personal satisfaction of overcoming challenges to start
and operate an enterprise appears to motivate entrepreneurs (Bird, 1989). Also, involvement in other peoples' lives, including having others dependent upon the success of their venture, provides satisfaction for entrepreneurs (Timmons, 1989). An ability to work with and through others is a common attribute among entrepreneurs. Although entrepreneurs are frequently described as being very individualistic, they recognize the limits of their knowledge and possess an ability to express their vision to others and enlist individuals to complement their skills and minimize their weaknesses (Bird, 1989; Timmons, 1989). Amabile cited intense intrinsic motivation and a passion for a given activity as being hallmarks of entrepreneurs (Amabile citing Stevenson, Roberts, & Grousbeck, 1989; Timmons, 1994).

Mitton (1989) provided a general summary of what he maintained reflected accumulated research on entrepreneurship in providing a typical profile of successful entrepreneurs. Mitton suggested entrepreneurs express an ability to "understand the policies, procedures, and rules of a system", an ability to put environment, people, events, information and technology into understandable perspective" (p. 11), while simultaneously understanding influences outside of a system. He referred to this ability as the ability to see the "big picture or see the forest as well as the trees" (Mitton, 1989, p. 11). He suggested that entrepreneurs are adept at spotting unique opportunities. This ability is expressed in putting resources and information together in new combinations, and in "turning the commonplace into the unique and unexpected" (Mitton, 1989, p. 12).

A total commitment to their cause or mission and the tendency to "tackle their projects with unrelenting zeal... persisting with a sense of urgency that borders on
obsessive” are also common attributes of entrepreneurs (Mitton, 1989, p. 12). Mitton suggested entrepreneurs “see a need for total control” that is reflected in the way they “position themselves so as to control the flow of information, dispense rewards and punishments, and allocate critical resources” (Mitton, 1989, p. 12). He maintained entrepreneurs express a utilitarian view of right and wrong. Their commitment to their purpose is so focused that “other dimensions of a situation often become incidental or secondary, including principle, propriety, protocol, even friendships and laws. They do what is necessary to accomplish their goals. They view the legitimacy of their actions in utilitarian rather than moral dimensions” (Mitton, 1989, p. 14).

According to Mitton, entrepreneurs welcome uncertainty and risk, but purposefully “define their objectives, strategy and mix of resources to limit risk” (Mitton, 1989, p. 14). The use of personal contacts and connections are important to entrepreneurs, and use contacts to “open doors and pave the way for events to unfold to their advantage” (p. 16). Entrepreneurs also embrace competence within themselves and in other people, and enhance their opportunity for success by surrounding themselves with competent people. Mitton believes entrepreneurs possess “special know how” or knowledge of technologies, processes, products, markets, or systems” (p 17). He indicated that specialized knowledge or extensive experience enables entrepreneurs to form patterns or chunks of information and “action consequence associations to provide them with an ever-growing ability to make intuitive judgments and give them the confidence to take deliberative action” (Mitton, 1989, p. 17).
Individual Attributes Associated with Creativity and Innovation

Because of the close connection between entrepreneurship and innovation and creativity, and since this research is concerned with the working styles of faculty who are identified with entrepreneurship or entrepreneurial creativity, literature relating to individual characteristics associated with creativity, and literature pertaining to environmental conditions that inhibit or enhance creativity and innovation in an organizational context, was reviewed. Creativity and innovativeness for entrepreneurs may be expressed in many different ways, including through an overall working style that reflects creativity and innovativeness, or in the specific creation of unique, innovative or inventive products and processes. A discussion of some of the attributes that are commonly associated with individuals who frequently produce work that is judged as creative or innovative follows. Although most observations made in this section relate to individual attributes, some of the observations reference the individual in the context of his or her work environment. Expanded organizational references are provided in the next section.

Expertise and Passion

Expertise within a given domain appears to be a prerequisite for expression of high levels of creativity. Csikszentmihalyi (1990, 1996) found that when individuals commit to truly learning a domain, they develop a single-mindedness, and they can draw upon reserves of energy. Committing to a domain is similar to finding a passion or voice. With a passionate commitment to a domain, the need to find solutions to problems or create works at higher levels of complexity naturally results. Csikszentmihalyi suggested
that individuals need to both commit to seeking a deep understanding of their chosen field, while simultaneously appreciating other areas. Seeking divergent opinions, and appreciating divergent styles, brings your own area into sharper focus, and helps reveal fresh approaches. Csikszentmihalyi maintained that immersion within a topic for ten or more years is generally required before major creative breakthroughs occur (Csikszentmihalyi, 1990, 1996).

When individuals are committed or passionate about a domain, they are more likely to experience a state of consciousness that Csikszentmihalyi has labeled as "flow". When an individual is experiencing flow, concentration is almost total, clarity is great, there may be a sense of timelessness, and an individual is so immersed in the activity that there is a sense of un-self-consciousness that facilitates an uninhibited creative process. Carefully choosing a domain in which an individual may have some natural proclivity for success appears to increase the likelihood for achieving optimal creative success. Bird (1989) suggested that entrepreneurial behavior is "passionate, full of emotional energy, drive and spirit. The passion can best be seen over time, in the persistence, tenacity, and long hours in the start-up and growth phases..." (Bird, 1989, pp. 6-8). Similarly, Winslow referenced both Hertzberg (1985) and Peters (1982) in suggesting that climates that promote entre(intra)preneurship reflect a use of passion. In those types of environments, “people are excited, spontaneous, impertinent, questioning, argumentative, iconoclastic, irreverent, experimental and dedicated to problem solving and producing” (Winslow, 1990, p. 260). Amabile (1997) suggested that expertise, high task motivation, and creativity skills are important to expressing individual creativity. Regarding expertise she asserted:
expertise is the foundation for all creative work. It can be viewed as the set of
cognitive pathways that may be followed for solving a given problem or doing a
given task -- the problem solver's network of possible wanderings (Amabile,
1997, citing Newell and Simon, 1972, p. 82). The expertise component includes
memory for factual knowledge, technical proficiency, and special talents in the
target work domain -- such as expertise in gene splicing, or in computer
simulation, or in strategic management. (p. 42)

Expertise within a domain is related to productivity. Simonton (1999, 1994)
reported that lifetime productivity for highly creative individuals is much higher than for
individuals less eminent. Working on multiple projects concurrently may be one way
that highly creative individuals manage time-consuming problem solving. Highly
creative individuals frequently report that insights are made for another project when
focused energy is given to a different problem (e.g. Csikszentmihalyi, 1996; Shekerjian,
1990; Simonton, 1994).

Challenges

Challenges are important to achieving high levels of creative expression, but the
challenges should not be so great that frustration results. Challenges can create a state of
arousal in which a state of flow may result if the challenges are met. Anxiety, frustration,
and failure can result if the challenges are too great for the current skill set or knowledge
base (Csikszentmihalyi, 1996). A playful, childlike attitude toward a given area is
important to creative expression. Conditions of creativity are also present when several
paradoxical circumstances exist. Creative conditions include a balance between
detachment and commitment, passion and decorum, and deferral and immediacy (Bruner,
1979).
Csikszentmihalyi (1996) and Amabile (1996), among other scholars, report that creativity and innovation thrive in environments in which substantial, but not overwhelming challenge exists (Amabile, 1988, 1996; Csikszentmihalyi, 1996). Creative breakthroughs are often associated with persisting through difficult problems. Individuals who make creative breakthroughs often have false starts, delays and unproductive tangents before succeeding (Gruber, 1988 in Sternberg, 1988). Challenges need to be accompanied by support for optimal conditions of creativity (e.g. Amabile, 1988, 1996, 1998). Support can take many forms. It may include resources such as time, money, people, equipment, facilities, endorsements, backing or approval (e.g. Amabile, 1988, 1996, 1998; Kanter, 1988).

Intrinsic Motivation

Creative individuals express a high level of intrinsic motivation. Amabile defined intrinsic motivation as “the motivation to work on something because it is interesting, involving, exciting, satisfying, or personally challenging” (Amabile, 1997, p. 39). She asserted “there is abundant evidence that people will be their most creative when they are primarily intrinsically motivated, rather than extrinsically motivated by expected evaluation, surveillance, competition with peers, dictates from superiors, or the promise of rewards” (Amabile, 1997, p. 39 citing Amabile, 1983). Interest in the task is valuable in that it helps establish a condition in which a person expresses an enormous amount of energy in order to master the domain. Scholars also refer to intense intrinsic motivation as a passion or love for a domain or field (e.g. Amabile, 1988, 1996, 1997; Csikszentmihalyi, 1988, 1996; Goleman, 1993; Simonton, 1994).
Frequently, entrepreneurs are associated with high levels of passion or intrinsic motivation for creating a new organizational structure. Intrinsic motivation is reflected in behaviors associated with persistence and striving to overcome difficult intellectual problems. Individuals with high intrinsic motivation, may also express a high level of tolerance for ambiguity that is associated with working with difficult problems, and with uncertainties and risks associated with undertaking projects that may involve risk. Amabile cites intense intrinsic motivation and a passion for a given activity as hallmarks of entrepreneurs (Amabile citing Stevenson, Roberts, & Grousbeck, 1989; Timmons, 1994).

According to Amabile (1988, 1996, 1997) intrinsic motivation can be increased by subtle changes in an organization’s environment. Employers that enable employees, within limits, to choose projects and especially the methods of accomplishing a project, are more likely to promote creativity and innovation (Amabile, 1988, 1996; Csikszentmihalyi 1996, Kanter, 1988). In discussing the importance of intrinsic motivation for creativity for individuals in the work environment, Amabile suggested that some types of extrinsic motivating factors that are commonly referred to as extrinsic rewards may enhance creativity under certain conditions. She asserted that rewards, recognition, and feedback that confirm competence or increase a person’s involvement in the work may promote creativity. These type of rewards are referred to by Amabile as enabling extrinsic motivators. These enabling motivators are more likely to have positive impact upon creativity if intrinsic motivation is also high (Amabile, 1997). In contrast, certain extrinsic motivators or rewards, especially those that control behavior, such as by
placing constraints on how a task is performed, or the timing of reward, have a detrimental effect on the creative process (Amabile, 1997, p. 46).

**Proactively Shaping Environment**

Creative individuals are proactive in shaping and controlling their environments (Csikszentmihalyi, 1996). Time pressure is a condition that may have an impact upon the creative process. In situations where an individual or work group may sense an external threat or competition from another organization to produce a product, time constraints may have a motivating impact upon individual team members and the group as a whole. A time pressure may motivate employees to give great effort and to focus upon what is truly necessary to accomplish the task (e.g. Amabile, 1996). Setting deadlines, even if they are intermediate deadlines, can help create a sense of urgency that may advance the creative process (e.g. Harrington, 1999). Entrepreneurs are generally considered adept at performing many tasks concurrently and may thrive in ambiguous environments. Under some circumstances, time pressure may not enhance employee productivity and the creative process. Projects with arbitrary deadlines may hinder the creative process.

An important negative impact on the creative process that extreme time pressures may effect is that of time for incubation of ideas. Incubation is referred to as a time during which an individual or groups of individuals may not be actively working on a specific problem, but in which their mind is still working on a problem subconsciously (e.g. Csikszentmihalyi, 1996; Smith & Dodds, 1999). Incubation is related to reflection, another important aspect of the creative process that involves piecing together information either consciously or unconsciously related to the problem under
consideration (e.g. Gardner, 1997). Time needed for incubation of ideas may vary greatly by type of task, and by individuals (Csikszentmihalyi, 1996).

Highly productive groups and individuals shape their physical work environments to fit their needs (e.g. Csikszentmihalyi, 1996; Harrington, 1999). Individual preferences are important concerning what conditions facilitate their optimal performance (e.g. Csikszentmihalyi, 1996; Goleman, 1993). Moreover, individual preferences may differ depending on individual tasks. Some tasks may require open work environments that promote open communication among project team members. As such, open area offices may be arranged for ease of communication. Other tasks may involve solitary thinking, writing, and contemplation for which an environment free of distractions is preferable (Csikszentmihalyi, 1996). Highly creative individuals engage in some activities in which they prefer the familiar surroundings of an office or laboratory to which they report on a regular basis. At different times, that same individual may prefer to work at a different work site. Csikszentmihalyi (1996) suggested that creative insights are often made in aesthetically pleasing locations. However, practical implementation of creative ideas often proceeds smoothly in routine surroundings. Csikszentmihalyi (1996) emphasizes that creativity is enhanced for individuals when they actively control choice of activities and use of time.

Csikszentmihalyi (1996) acknowledged that individuals do not have equal access to optimal work environments, but that nearly any work environment can be shaped to fit an individual’s personality. However, access to specialized equipment or field sites for some fields are so critical that creative problem solving may not be possible without
access (e.g. Harrington, 1999). For scientists, a laboratory equipped with state-of-the-art equipment or at least access to appropriate equipment such as telescopes and DNA sequencers or to equipment at a federally funded laboratory may be critical. Similarly, certain art forms may require access to specific materials. Further, some artists may require access to settings that inspire their work. Overall, creative individuals require independence with respect to time of work, and prefer to personalize their work and leisure time (e.g. Csikszentmihalyi, 1996).

Organizational Enhancements and Inhibitors to Creativity and Innovation

Introduction

The work of faculty members is performed both individually and in collaboration with representatives of their home institution and with colleagues at other institutions. Regardless of whether the nature of a professor's work is primarily solitary or emphasizes collaboration with other people, their work is influenced by the working environment of their home institution, and especially by their specific academic unit. Thus, it is appropriate to consider how individual innovation, creativity, and entrepreneurship are influenced by organizational climates or environments. This section includes a general overview of common themes within the literature of organizational attributes or climates that are generally known to either enhance or inhibit creativity, innovation, and entrepreneurship. Following the general overview is an expanded discussion of a few of these organizational characteristics.

Researchers on these topics frequently emphasize the importance of the interaction of multiple factors within the environmental context that may make the
attributes referenced in this section more or less important. For example, Ekvall (1999) asserted that it is well established that creative individuals thrive under conditions where there is a high degree of ambiguity; however, he also suggests that researchers have also found that individuals who are highly creative, but who lack a high level of self-esteem may have lower tolerance for ambiguity and need focused goals and direction in order to fully realize his or her creative potential (Ekvall, 1999). While it is not practical for this section to emphasize all of the complex variables that may influence these general findings, it is important to note issues such as size and type of organization, type of creative endeavor, knowledge base and experience level of employees, career stage, and attributes of an organization’s history, culture, and climate, influence the applicability of general principles associated with organizational creativity and innovation.

General Overview of Organizational Enhancements and Inhibitors to Creativity, Innovation, and Entrepreneurship

Organizational characteristics and general environmental conditions interact with individual behaviors to enhance or inhibit organizational creativity and innovation (Amabile, 1988). Amabile developed a theory of organizational creativity and innovation to describe how creativity and innovation are advanced in an organizational context. The theory which she called the componential theory of creativity and innovation, predicts that elements of the work environment will impact individual creativity. It proposes that the creativity produced by individuals and teams of individuals serves as a primary source of innovation within the organization...The most important feature of the theory is the assertion that the social environment (the work environment) influences creativity by influencing the individual components. (Amabile, 1997, p. 52)
Work environments or working conditions within organizations are influenced by organizational cultures and climates. Organizational cultures and climates influence creativity and innovation within organizations (e.g. Davis, 1999; Ekvall, 1999; Harrington, 1999; Kanter, 1988; Tesluk, Farr, & Klein, 1997). Culture refers to the deeply held values and beliefs of an organization, and is reflected in the mission and goals of an organization. Individuals within organizations are socialized into organizations and learn the behavioral norms that are rewarded. Organizational climates reflect an organization's culture and is reflected in organizational patterns, and behaviors (e.g. Davis, 1999; Ekvall, 1999; Davis, 1999). Organizational rules, policies, procedures, norms of behavior and organizational structures established by an organization reflect an organization's climate (e.g. Ekvall, 1999).

Concerning culture in a corporate context, Amabile (1988) stated “a corporate culture in which cooperation and collaboration across levels and divisions, risk taking, and innovation are valued and prized, and in which failure is regarded as a learning experience, can play a major role in stimulating and supporting innovation” (Amabile, 1988 cited in Arad, et al., 1997, p. 53). Davis (1999) maintained that individual creativity is inhibited, and thus, organizational innovation less likely when individuals are socialized to be efficient, rational, logical, avoid mistakes, and conform to norms. Amabile (1988, 1997) reported that her research findings suggested that factors that enhanced innovation included freedom and autonomy relating to work processes, good project management, sufficient resources, and encouragement. Creativity, according to Amabile, is promoted when employees have freedom to choose the process by which
they will achieve goals. Amabile reported qualities that inhibited creativity were various organizational characteristics including inappropriate reward systems, red tape, lack of cooperation and regard for innovation, and constraints on how to accomplish a task. Also inhibiting creativity included lack of control over work and ideas, organizational disinterest, poor project management, evaluation (unrealistic expectations, criticism), time pressure, and overemphasis on status quo and competition.

Arad et al. (1997) suggested that organizational innovation is stimulated by high levels of autonomy facilitating idea generation, freedom and control, cross-functional work teams, leadership styles that promote experimentation, entrepreneurship, risk-taking, change and innovation. Innovation is promoted with a participative and collaborative managerial style that supports an innovative culture, organizational and personal goals that focus on quality over efficiency, risk-taking and responsiveness to environment (Arad et al., 1997). Rewarding innovative effort and outcomes, including risk-taking and experimentation, reward systems that reflect flat organizational structures, paying the person and not the job, rewarding team performance, and gainsharing and profit sharing are organizational attributes that promote innovation (e.g. Arad et al., 1997; Kanter, 1988).

Kanter (1988) suggested that the innovation process is uncertain, knowledge-intensive, controversial, and inter-disciplinary. Citing numerous scholars, she suggested that different types of innovation, such as process, product, technological, and evolutionary innovations may occur under different conditions. For example, "technological innovations may be more likely when resources are abundant;
administrative innovations when resources are scarce” (Kanter, 1988 citing Kimberly, 1981, p. 172). In general, for innovation to flourish within organizations there needs to be "information (data, technical knowledge), political intelligence, expertise, resources (funds, materials, space, time); and support (endorsement, backing, approval, legitimacy)” (Kanter, 1988). Kanter also suggested that diversity and complexity within organizations is important to stimulating innovation. She asserted, “to produce innovation, more complexity is essential: more relationships, more sources of information, more angles on the problem, more ways to pull in human and material resources, more freedom to walk around and across the organization” (Kanter, 1988, p. 178). She also maintained innovation is encouraged with “looser boundaries, crosscutting access, flexible assignments, open communication, and use of multidisciplinary project teams” (Kanter, 1988, p. 178). Isaksen found that “the more challenge, freedom, support, trust, prestige-free discussions, humor and risk-taking the individual perceived in the immediate social work environment, the higher he or she rated the possibilities to personally act creatively” (quoting Ekvall, 1999, p. 485 citing Isaksen, 1995).

Rules, Policies, Procedures, and Structures

Kanter (1988) maintained that innovation begins when individuals or a small group of individuals sense a new opportunity, and “are able to initiate a process of departing from the organization’s established routines and systems (Kanter, 1988, p. 173). Organizational conflict results from simultaneous organizational and individual needs relating to processes promoting stability and order with those stimulating, innovation, change and general conditions influencing individual creativity. Kanter (1988) provided a valuable interpretation of that tension. She suggested:
organizational conditions -- structure and social arrangements -- can actively stimulate and promote innovation, as long as those conditions take into account the 'organic', 'natural', and even 'wild' side of innovation. Innovation is the creation and exploitation of new ideas. At its very root, the entrepreneurial process of innovation and change is at odds with the administrative process of ensuring repetitions of the past. The development of innovation requires a different set of practices and different modes of organization than the management of ongoing, established operations where the desire or expectation of change is minimal. Stevenson and Gumpert have cast this management difference in terms of the contrast between the 'promoter' type stance of the entrepreneur, driven by perception of opportunity, and the 'trustee'-like stance of the administrator, driven to conserve resources already controlled (see also Hanan, 1976). Structures and practices that may work well for the perpetuation of the known tend to be at odds with innovation. (p. 170)

Creativity researchers acknowledge that policies, rules, and procedures play an important role in maintaining a degree of order and control within organizations, and thus are legitimate aspects of organizational behavior. Simultaneously, however, rigid implementation of rules, policies, and procedures, in which employees have limited discretion for exercising judgment are believed to inhibit organizational innovation and development (e.g. Amabile, 1988, 1996, 1997; Amabile et al., 1996; Arad et al., 1997; Harrington, 1999; Kanter, 1988). Arad et al. (1997) reported key inhibitors of innovation include specialization, formalization, standardization, and centralization. Viewing policies and procedures as flexible guidelines for behavior was recommended as a more positive way of maintaining necessary continuity and order while simultaneously promoting the creative process (Amabile, 1996, 1998; Tesluk et al., 1997). Inflexible policies and procedures drain energy and lessen motivation for initiating creative output. Highly creative individuals, however, also frequently figure out ways of subverting policies that inhibit their creative behaviors. Bennis (1997) suggested that an important role leaders of groups engaged in the creative process must assume is that of running
interference, providing support and finding resources so that teams may concentrate on solving problems rather than on satisfying rules and regulations.

Ekvall has stated “organizations that are characterized by control and restraint become tense and boring” (Ekvall, 1999, p. 406). In contrast, he suggested organizations with playful, open environments, including those in which humor is often present, stimulate innovation. He maintained that “innovation starts with new ideas, and these occur easily in a playful atmosphere, where the critic/censor found within each person is forced into the background” (Ekvall, 1999, p. 406). When considering how environments can act upon individual creativity, Albert and Runco (1990) indicated that studies support evidence that expected evaluation, and surveillance have a detrimental effect on creativity. Contracting for rewards can have a detrimental effect on creativity, whereas unexpected rewards can have a positive effect on creativity. Competition for prizes has a detrimental effect on creativity and restricted choice in how to do an activity can have a detrimental effect on creativity (Albert & Runco, 1990).

Conflicts, debate and disagreements are present in organizations that are innovative, and can be used to promote innovation. A characteristic of innovative organizations, however, may be effort on the part of individuals to keep the debate focused on the project, rather than have the conflict become personal (Ekvall, 1999). Innovation involves a level of uncertainty, and with uncertainty comes risk. Therefore, innovation also involves risk. Individuals working within the context of organizations are more likely to experiment, develop new skills and knowledge expertise and seek innovative solutions, if they believe that failure in the process of attempting to create will
not have catastrophic consequences. In organizations with tight controls, overly bureaucratic or formal structures, individuals may adopt a working style that emphasizes avoiding risks and thus taking less initiative. Concerning innovative organizations, Ekvall (1999) suggested “tolerance for uncertainty, experimentation and the readiness to make decisions on the fly and capture the moment are perhaps the most distinctive features of the innovative climate” (p. 407).

Resources

Resources is a broad term used to describe assets to help individuals and organizations achieve objectives. There are many categories of resources that influence individual and organizational creativity, innovation, and entrepreneurship. Some of them include capital, such as cash and other financial instruments, property, and equipment. Capital of various forms enables individuals and organizations to purchase services of individuals with special expertise (human resources), equipment, physical work space such as laboratories, offices, and studios (facilities), travel, and time. Directly and indirectly, the importance of resources has been referenced throughout this literature review. For example, within a business context for entrepreneurship obtaining and effectively utilizing resources is important to success. Management of the resource of time and the importance of time for idea incubation and shaping physical space were referenced in relation to individual creativity. Opportunism with respect to obtaining and using resources to advance the work of professors is included within the researcher’s broad definition of academic entrepreneurship. The resource of knowledge domain expertise is considered a foundation for innovation and creativity (e.g. Amabile, 1988, 1996, 1997; Csikszentmihalyi, 1990, 1996). The complexity of and motivational effects
of various types of rewards, a type of resource, were discussed in the context of individual and organizational creativity and innovation.

Mumford, Whetzel, and Reiter-Palmon (1997) stated “perhaps the most concrete step organizations might take to promote creative problem solving is to provide the requisite resources. Perhaps the most obvious illustration of this point is to consider the plight of the scientist who lacks the equipment needed to conduct experiments” (p. 12). They emphasized that while fiscal resources are important, enabling time for employees to “devote time to creative thought” (p. 12) is also important. Inadequate time for creative thought may lead to stress which has been associated with inhibiting creative thought (Mumford, Whetzel, Reiter-Palmon, 1997 citing Carson, Bittner, Cameron, Brown & Meyer, 1994). Stress may reduce “attentional resources that can be devoted to problem solving. They maintained that “organizational interventions intended to reduce overload and conflict, two important cases of stress in organizations (Landy, 1989) might contribute much to the possibility of creative thought” (Mumford, Whetzel, Reiter-Palmon, 1997, p. 13). Amabile et al. noted that “a number of researchers have suggested that resource allocation to projects is directly related to the project’s creativity (Cohen & Livinthal, 1990; Dmanpour, 1991; Delbecq & Mills; Farr and Ford, 1990; Kanter, 1983; Payne, 1990; Tushman & Nelson, 1990). Amabile et al. indicated resource availability may place obvious “practical limitations on what people can accomplish in their work” and may affect employees psychologically by sending messages to project members concerning “the intrinsic value of the projects that they have undertaken” (Amabile et al., p. 1161).
Higher Education Context for Entrepreneurship

Many aspects of academic life promote optimal creativity and innovative thinking. Conditions vary widely by institutions and institution type, but in general, academic values include a small teaching load to allow time for research and service, released time for research, academic freedom which implies autonomy in choosing teaching methods and research topics. Summers for many professors are available for concentrated research, sabbaticals for renewal, conference attendance to exchange ideas, opportunities for inter-disciplinary research, and sponsored research support for equipment and other needs associated with projects are all attributes of higher education to promote creativity and innovation. Many of these attributes are similar to those that promote innovations in a corporate context.

Contradictions, however, exist within higher education structures for entrepreneurship, innovation, and creativity. Higher education is characterized as flexible, adaptable, and responsive to emerging societal trends (e.g. Altbach, Berdahl & Gumport, 1999; Kerr, 1995). The professional faculty has a great deal of autonomy to accomplish its goals. The decentralized nature of higher education promotes experimentation among individual faculty. Those characteristics suggest a general climate that would promote innovative behaviors. Simultaneously, however, higher education is considered tradition-oriented, stability-seeking, and highly political with tenured faculty having a vested interest in ensuring that change or innovation does not occur in a way that jeopardizes their power and influence. Overall, there is tension within higher education between tradition and innovation.
A common theme in corporate literature is to promote innovation and creative thinking through the utilization of teams that represent multiple disciplinary perspectives (e.g. Amabile, 1996, 1997; Arad et al.; Kanter, 1988). Within higher education, there is a trend to collaborate with faculty from other disciplines, but, there is debate concerning the extent promotion decisions reward faculty who are taking inter-disciplinary perspectives on topics (e.g. Miller & McCartan, 1990). Higher education institutions must balance promoting innovation and creativity in faculty work with stability and rationality processes. Faculty simultaneously engage in processes that involve preserving knowledge (teaching), providing service to their institutions and disciplinary societies, as well as creating products that advance knowledge (e.g. Altbach, Berdahl & Gumport, 1999; Blau, 1994; Kerr, 1995; Rosovsky, 1990). Environmental aspects that promote one or more of those objectives may inhibit other purposes. Debate is on-going within higher education concerning ways of balancing competing demands even if creative and innovative conditions are not optimal.

Blackburn and Lawrence (1995) suggested faculty environments consist of complex interactions among conditions, responses, and social contingencies. Professors are part of dynamic multi-faceted institutions, each representing its own unique history, and culture. Faculty are influenced by many sub-environments such as academic unit, research centers, institution, disciplinary associations, government agencies, students, and business and industry partners. Individual faculty members shape and are shaped by the environments in which they work.
The structures and values of higher education that promote the creative production of knowledge undoubtedly have had a major impact on how other organizations structure their work environments for optimal creativity. Core academic values such as academic freedom, high intellectual standards, tenure, high intrinsic motivation and interest in areas of expertise, and collegiality represent several areas that promote creative expression. Other important enhancements to the creative process are decentralized decision-making within academic units, substantial resources, including availability of specialized equipment for some professors to pursue their scholarly interests, flexibility concerning projects undertaken, and working hours. Creative thinking is enhanced through opportunities to work in collaboration with stimulating colleagues at home institutions as well as with faculty at other institutions. Furthermore, for some professors there are opportunities to work in aesthetically pleasing environments, sabbatical opportunities, and limited teaching time to allow for intensive research.

A less optimistic view of conditions for creative output within higher education may reference institutional policies, procedures and rules that are tightly enforced and serve to restrict entrepreneurial activities of professors. Policies that may be included in those categories include restrictive intellectual property policies that do not provide for fair compensation of inventions, restrictive policies concerning released time for research, as well as enforcement of policies associated with outside consulting income. Poor working conditions in the physical plant with inadequate office space, and poorly functioning laboratories could also negatively impact creative behaviors. Other negative conditions could include a heavy teaching load, as well as advising and service loads that
allow few hours of concentrated time for research and writing. Lack of availability of support personnel to handle administrative functions, and time-consuming governance responsibilities represent other ways in which demands for time and attention of professors may sap creative energy.

Slaughter and Leslie (1997) asserted that a nonsupportive institutional or disciplinary culture will influence the type and quality of entrepreneurial behaviors by faculty. Institutional leaders within institutions with primarily a teaching emphasis may not support entrepreneurial behaviors in areas outside of teaching (Fairweather, 1988). Workloads may be structured such that little time is available for pursuit of outside activities. Individual faculty are frequently constrained by departmental, institutional or system-wide policies prohibiting certain types of entrepreneurial activities (Fairweather, 1988, 1996; Slaughter & Leslie, 1997).

The likely availability of resources has a major impact on faculty engagement in entrepreneurial behaviors (Slaughter & Leslie, 1997). Academic entrepreneurs are resourceful in positioning themselves to obtain resources. This resourcefulness is expressed in ways such as choice of topics that may have some market potential, especially for obtaining grant funding. It may take the form of greater facility in working within the departmental framework to secure released time, and collaborating with faculty at other institutions who assist in obtaining financial support for projects. It can also take the form of effectively utilizing cheap labor in the form of graduate and undergraduate students. In expressing entrepreneurial behaviors in obtaining internal and external resources, faculty who have greater access to resources through whatever means
have an accumulative advantage. Faculty operating within environments in which there are a wealth of resources, financial and otherwise, are in a greater position to pursue entrepreneurial activities. Similarly, the accumulative advantage of institutional and departmental prestige has an impact upon the likelihood of obtaining additional resources to pursue entrepreneurial activities.

Academic entrepreneurs may express qualities and preferences for environments that are frequently associated with individual creativity and innovativeness and of groups that are successful in making creative and innovative breakthroughs. Some of these qualities include persistence and focused energy on solving problems, recognition of abilities, disciplinary competence, avoiding distractions, use of relationship networks, development of products and processes that are judged as innovative by disciplinary peers, aversion for bureaucratic obstacles, and resourcefulness. Importantly, academic entrepreneurs may control their time and are very successful in engaging in activities that are complementary.

Higher education institutions, like other organizational forms are complex and dynamic, with individual histories, cultures, climates, and missions. Academic units are frequently loosely coupled, with interdepartmental interactions varying widely (e.g. Birnbaum, 1988 citing Weick, 1976). Individual faculty members express varying degrees of local or cosmopolitan orientation. Institutions of higher education are also unique in the degree of latitude with which individual faculty members pursue research agendas. Notwithstanding the complexities that make comparisons with other organizational types and individuals outside of academe difficult, some principles
relating to environmental characteristics promoting innovation, entrepreneurship, and innovation from differing organizational contexts can provide insights or at least stimulate discussion of how individual scholars and academic units can structure their environments to promote innovation, creativity, and entrepreneurship.

Studies of Academic Entrepreneurship

Louis et al. (1989) conducted a study of entrepreneurial behavior among life scientists. They defined academic entrepreneurship “as the attempt to increase individual or institutional profit or prestige through the development and marketing of research ideas or research based products” (Louis et al., 1989, p. 110). Their literature review and associated research questions were in part concerned with topics such as describing the frequency of occurrence of certain types of behaviors, predictions concerning the likelihood of individual faculty engaging in certain behaviors, and local norms associated with academic entrepreneurship. Their study methodology included telephone interviews of approximately 40 administrators within life science departments at leading research universities, and an eight-page questionnaire directed to approximately 1,500 life scientists at 40 research universities. Some data on university policies and university characteristics were also collected during the interviews with university administrators. Their study considered five basic forms of academic entrepreneurship including, “1) large scale science (externally funded research), 2) earning supplemental income, 3) gaining industry support for university research, 4) obtaining patents or generating trade secrets, and 5) commercialization -- forming or holding equity in private companies based on a faculty member’s own research” (Louis et al., 1989, p. 11). In these five forms of academic entrepreneurship, inter-relating with business, industry, and
government in some way and obtaining resources to advance faculty research appeared to be important characteristics of entrepreneurship in an academic context.

When discussing organizational level variables associated with academic entrepreneurship, Louis et al. referenced Wade (1984) in noting that "universities can encourage or discourage faculty consulting and involvement in commercialization through development and enforcement of policies." In their study, however, they indicated that their data indicate that "administrative support has little effect on entrepreneurship" (p. 120). Subsequently, however, Louis et al. suggested that there may be other policies and procedures not examined in their study that may influence entrepreneurial behaviors. Overall, the clearest findings of Louis et al. were that local norms influenced the types and intensity of entrepreneurial behaviors. In this regard, they suggested that for some forms of entrepreneurship, especially commercialization, "individual characteristics are moderated by institutional location." They suggested four possible explanations of the effect local norms have on entrepreneurial behaviors. They maintained that (1) "self-selection may produce value and behavior consensus (individuals are drawn to these settings because they are known to be supportive of or tolerate entrepreneurship); (2) behavioral socialization may operate within a work group (individuals are affected by the behavior of their immediate colleagues and tend to act like them); (3) organizational culture may be a factor (a broader set of institutional policies, procedures, and values reinforces attitudes and behavior regarding entrepreneurship); or (4) strategic management may be a factor (some universities use recruiting to position themselves in the forefront of changing patterns of academic
behavior in order to reap the potential benefits in increased prestige and income)” (Louis et al., 1989, p. 129).

Bird and Allen (1989) studied issues relating to academic entrepreneurship in their study of the professors in four areas at the University of North Carolina and North Carolina State University. The four areas included physical sciences, biological sciences, engineering and professional schools. The sample was obtained from a list of faculty who had received an external grant or contracts over the last two years. Survey questions focused on the type of commercialization-related activities the professors had been involved in and whether they intended to engage in commercial activities in the future. Although engagement in consulting was an aspect of this study, their study terminology emphasized commercialization of research as what was primarily considered as entrepreneurial, whereas consulting was presented as contributing to or complementing commercialization of ideas. Key findings for this study were the common occurrence of consulting by faculty. More than 70 percent of the professors in this study had a paying consultancy within the last two years at the time of the study, and “a much smaller portion of professors were involved in business commercialization to develop, test or produce a product, service, process, or technique for market” (Bird & Allen, 1989, p. 589). Also, the data for this study suggested that faculty were not likely to leave their university position as a result of commercialization of ideas.

This study asked participants if policies, practices and procedures within their departments and institutions were supportive, of no effect, or restrictive with respect to commercializing ideas. At the institution level, responses were evenly split with
approximately one-third for each of the three categories. In comparing responses
concerning departmental level policies with institutional level policies, departmental
policies were seen as both less restrictive or as having no effect. Departmental policies,
however, were not perceived as more supportive of commercializing than institutional
policies. Bird and Allen suggested in this study and in a later study by Bird that different
value orientations of entrepreneurs and professors may in part explain why more
professors do not attempt to commercialize that their ideas. Bird and Allen suggested
that academic values relating to knowledge creation and transmission were reinforced
through doctoral training, and the tenure, promotion and reward systems of universities
(Bird & Allen, 1989, p. 593). In summarizing potential differences in academic and
business entrepreneurial cultures, Bird and Allen (1989) stated:

> Academic activities often take on longer future time horizons for feedback and
require patience and persistence (results can take months or even years to be
seen); entrepreneurship is in contrast very here-and-now and action oriented. In
general academia is bureaucratic, slow to change and low on stress, at least
among faculty; entrepreneurship involves organizational birth, rapid change and
growth and considerable stress. With tenure the academic career is relatively
secure; entrepreneurs, by accepting risk for potential rewards, have an insecure
career even if his or her venture succeeds. Academic life allows extended contact
with family and friends; entrepreneurs, at least during start-up periods of rapid
organizational growth, have considerably less free time (60-70 hour work weeks
are common among entrepreneurs). (p. 593-594)

Slaughter and Leslie (1997) purposely selected the term “academic capitalism”
for their study of behaviors that other scholars may refer to as academic entrepreneurship.
They believed that the word capitalism more clearly implies a market orientation that
entrepreneurship may not. They defined academic capitalism as “activities undertaken
with a view to capitalize on university research or academic expertise through contracts
or grants with business or with government agencies seeking solutions to specific public
or commercial concerns.” In their definition, consulting is included only if revenue
entered university accounts, university expertise was involved, and activities were applied or developmental in nature" (Slaughter & Leslie, 1997, p. 114).

_Licensing, Patents, and Business Start-Ups_

Entrepreneurial activities of faculty may include pursuing licensing, patents and starting a company as a result of the technology developed by the faculty member or team of researchers (e.g. Clauson-Wicker, 2000; Fairweather, 1996; Slaughter & Leslie, 1997). Issues of vital concern from this perspective include securing start-up capital, protecting the invention, and agreement over how profits are to be divided among faculty, home institution and corporate sector (Anderson, 1990; Slaughter & Leslie, 1997). Entrepreneurs of this type within higher education were primarily science, engineering, and technology oriented, although other fields and disciplines produce products with market potential (Fairweather, 1998). Recently, case studies of faculty involvement in, and institutional support of, initiatives relating to software development, telecommunications, biotechnology, and applied science are featured regularly in higher education-related and business-related resources (e.g. Clauson-Wicker, 2000; Wilson, 2000). Common elements of these case studies included potential profits of successful entrepreneurial activities, issues pertaining to sharing expenses and profits associated with entrepreneurial activities, competition for time and attention of individual faculty members, potential conflicts of interest in employing students, and policies that are devised to share profits and discourage conflicts of interest. The case studies also frequently referenced the impact entrepreneurial activities may have on the overall institutional culture and institutional mission.
In 1980, the federal government encouraged universities to engage in commercialization of products by authorizing universities to seek patents for inventions arising from federally supported sponsored research (Anderson, 1990). The incentive was to stimulate involvement in bringing new technologies to market. Universities have felt compelled to share profits with faculty investigators (Anderson, 1990). Scientists are the most likely group to benefit. Controversy within higher education sometimes results between knowledge areas with different commercialization opportunities (e.g. Anderson, 1990). Commercialization of products is also controversial because some people argue that an important reason higher education institutions receive public and philanthropic support is to create and distribute knowledge freely (Anderson, 1990; Slaughter & Leslie, 1997).

Commercializing products brings institutional prestige, with increasing prospects for student recruitment, favorable institutional rankings, and financial resources for individual faculty and the institution as a whole (Fairweather, 1988). Establishment of relationships with business can be a synergistic and symbiotic relationship for business and higher education (Fairweather, 1988; Slaughter & Leslie, 1997). Faculty gain access to resources such as equipment, research and development staff of corporations, and financial resources to advance topics of concern to a business.

Sponsored Research

The literature on academic entrepreneurship implies that individuals may be an academic entrepreneur if they consistently secure large federal or foundation grants to support their scholarship. Many of the studies the researcher reviewed relating to
academic entrepreneurship, especially within a science context, included some aspect of substantial successful grants and contracts work as reflecting entrepreneurial behavior (e.g. Bird & Allen, 1989; Bird, Hayward, Allen, 1993; Blackburn & Lawrence, 1995; Fairweather, 1988; Louis et al.; Slaughter & Leslie, 1997). Sponsored research represents obtaining resources such as staff and equipment to advance a scholar's research agenda. It can be considered analogous to business entrepreneurs obtaining capital to develop their business idea. Sponsored research also frequently represents obtaining resources to establish a formal or informal infrastructure to develop a product to deliver a service. In that way, sponsored research is similar to the organization-building aspect of entrepreneurial behavior.

Consulting

Earning supplemental income by serving as a consultant to business, industry, government, and other types of organizations is a common practice in higher education. Consulting is frequently viewed as a mutually beneficial way for faculty and representatives of other organizations to exchange ideas. Professors with reputations for substantial involvement in obtaining supplemental income through consulting activities are frequently described as entrepreneurs. Some forms of earning supplemental income from such on-going relationships with industry partners may generate controversy. Other forms of generating supplemental income, such as management consulting, and consulting that is done within the spirit of institutional guidelines may be less controversial. Guidelines commonly specify that consulting projects generating supplemental income not interfere with traditional responsibilities and not take up an
Boyer and Lewis suggested that supporters of faculty consulting view it as a "natural extension and application of one's professional and scholarly expertise" (Boyer & Lewis, 1985, p. 637). Proponents view consulting as enabling faculty to test academic teaching against real world practice. Critics, however, view faculty consulting as potentially neglecting students and other responsibilities. Boyer and Lewis (1985) found that biomedical faculty who consult were more active on research and no less active on other areas. In that study, they concluded that faculty who consult, teach as much, publish more, communicate with colleagues more frequently, and appear more satisfied with their careers and universities than non-consulting faculty. Several of the sources the researcher reviewed on faculty consulting were written in the early to mid 1980s when this issue appeared to receive greater attention by higher education researchers. Today, greater controversy appears to be generated by larger scale faculty-industry collaborations and by faculty who license a patent or establish their own company.

**Norms and Cultures for Academic Entrepreneurship**

Activities that constitute entrepreneurship may vary according to the organizational and departmental context. Securing sponsored research funding within a baccalaureate institution by a department that does not have an extensive track record of sponsored research may be considered entrepreneurial by colleagues. Conversely, within certain academic units at a large research institution, grant and contract funding may be considered less entrepreneurial, and more standard operating procedure (Fairweather,
At that type of institution, faculty are often expected to engage in sponsored research. In that context, activities such as extensive consulting or patenting or licensing activity may lead to a label of entrepreneurial rather than traditional sponsored research. What constitutes entrepreneurial behavior appears to be loosely defined, and can change according to the context in which it is considered.

Entrepreneurial behavior is an interaction between individual characteristics and environmental conditions (Bird, 1989). Environments can enhance or inhibit entrepreneurial behavior. Faculty norms within individual departments play a role in determining the level and type of entrepreneurial behaviors (Anderson, 1990; Fairweather, 1988; Slaughter & Leslie, 1997). Institution-wide culture and expectations also contribute to entrepreneurial behaviors. Faculty will attempt to meet the tacit and explicit expectations of their individual units (Fairweather, 1988). Thus, if there is an expectation for entrepreneurial behaviors, faculty will attempt to engage in such behaviors. Conversely, if more traditional scholarly pursuits represent the behavioral norms, faculty will be inclined to be less entrepreneurial (Fairweather, 1988).

Faculty rank appeared to have some bearing on just how entrepreneurial faculty will be, again within the context of departmental expectations. Pre-tenure faculty were likely to be engaged in traditional scholarly activities in order to earn tenure (Fairweather, 1988). However, if activities such as consulting, sponsored research, patents, and new venture creation contributed to earning tenure, faculty pursued those activities (Fairweather, 1988).
Emerging trends within higher education have implications for the promotion of entrepreneurial behaviors. Entrepreneurial behaviors can be promoted as institutions compete for the services of highly productive faculty. The opportunity to engage in entrepreneurial activities is frequently provided as an incentive to retain or recruit highly productive faculty. With the rise of pedagogical techniques relating to distance learning, and electronic campuses, faculty from a greater variety of disciplines are presented with opportunities for engaging in nontraditional activities.

Blackburn and Lawrence (1995) summarized the findings from researchers concerning characteristics of disciplinary productivity. They referenced a study by Wanner, Lewis, and Gregorio (1981) that found natural scientists “publish nearly half again as many articles than social scientists and two and one-half times more than humanists” (Blackburn and Lawrence, 1995, pp. 67-68, citing Wanner, Lewis & Gregorio, 1981). One reason for this productivity difference may relate to more settled paradigms among the natural sciences and consequently greater agreement concerning what constitutes quality research (e.g. Blackburn and Lawrence, 1995 citing Pfeffer, Leong, & Strehl, 1976). Blackburn and Lawrence (1995) also indicated that social scientists are more likely to produce books than natural scientists (Blackburn and Lawrence, 1995 citing Wanner, Lewis, and Gregorio, 1981). Blackburn and Lawrence (1995) in recognizing the uniqueness of disciplines, including productivity rates, used research approaches that emphasized comparing disciplines within disciplines rather than comparing across disciplines (Blackburn and Lawrence, 1995).
State governments have encouraged higher education partnerships, recognizing the potential of local, regional, or statewide economic growth that the relationships may bring (Fairweather, 1988). The intellectual capital of universities is featured as magnets for high technology and other industries that can draw from a labor pool of faculty and students (Anderson, 1990). Corporations gain access to the intellectual capital within a specific individual or a department on a project by project basis, thereby maintaining flexibility by making shorter term commitments to individuals (Anderson, 1990).

Individual faculty were frequently found to be constrained by departmental, institutional or system-wide policies prohibiting certain types of entrepreneurial activities (Fairweather, 1988, 1996; Slaughter & Leslie, 1997). For example, a pre-tenure faculty member may forego a textbook writing opportunity if a large commitment such as that will affect scholarly production in other areas. There may be restrictions placed on royalties earned from publications and earnings from licensing of patents (Anderson, 1990).

The unique identity of a college or university gives it a competitive advantage in areas such as commercialization of intellectual property. Charitable motives of friends, tax advantages, access to institutions and its markets, and goodwill represent other ways in which colleges and universities may have a competitive advantage. Well-structured projects, in some instances, lead to university-business research parks, and subsequent employment for faculty and students (Anderson, 1990).
Conclusion

The review of the literature described common attributes of entrepreneurial individuals in a business and general organizational context. It discussed activities that are commonly associated with entrepreneurship in an academic context such as sponsored research, consulting, and commercialization of ideas. The literature review linked entrepreneurial behaviors to behaviors associated with the promotion of innovation and creativity within individuals and organizations. It highlighted organizational conditions that were associated with advancing or inhibiting entrepreneurship, innovation, and creativity. This review of the relevant literature did not identify a specific theory or model of academic entrepreneurship that precisely articulates the major influences upon academic entrepreneurship within different academic disciplines, and why operationalization of entrepreneurship and influences upon entrepreneurial behaviors may differ by disciplines.

Conceptual Model of Entrepreneurship

The researcher developed a model of academic entrepreneurship that represents an adaptation and synthesis of the work of scholars of creativity, business entrepreneurship, and higher education. It recognizes the multiple and interactive factors that influence academic entrepreneurship. Broad categories of the model include individual characteristics, academic fields, individual college and universities, and specific academic departments and sub-units and society at large. Central aspects of all of the models considered are a recognition of personal attributes of individuals and environmental conditions interacting to create optimal conditions for entrepreneurial
behavior. Additionally, what is considered as entrepreneurial will vary according the context in which the behaviors are placed. Key elements of the model follow:

1. The cumulative effects of individual characteristics, disciplinary expectations and preferences, and prevailing departmental and institutional norms, and external environmental conditions (economic, political, societal preferences) ultimately determine the type of and intensity with which individual professors pursue entrepreneurial behaviors.

2. Individual characteristics suggesting a proclivity toward entrepreneurship contribute toward ultimate expression of entrepreneurial behaviors. Some propensity toward calculated risk-taking, opportunism, high achievement and intrinsic motivation as well an inclination toward creative problem solving and a working style utilizing creative strategies for optimization of creativity represent typical characteristics reflected in the general entrepreneurship and creativity literature as suggesting the possibility of successfully engaging in entrepreneurial behaviors. Entrepreneurial personality attributes may be a necessary, but not a sufficient, characteristic of entrepreneurship.

3. Higher education institutional cultures and climates are unique and can have differential impacts on whether entrepreneurship is encouraged or impeded.

4. Disciplinary cultures have differential opportunities to engage in entrepreneurial behaviors. Further norms of disciplines and departments concerning reward
structures and workloads influence proclivity of individual faculty toward entrepreneurship.

5. Like the concepts of entrepreneurship, creativity, and higher education that influenced the researcher's conceptual approach, academic entrepreneurship is contextual and dynamic. Individuals may vary from time to time concerning their gravitation toward entrepreneurial behaviors. The Zeitgeist or "spirit of the times" can influence opportunities and appropriateness of entrepreneurial behaviors (Johnson, 1985 in Bird, 1989). What is entrepreneurial within one context may not be considered as entrepreneurial in another context.

The model provides a simple visual representation of the complex, interactive, and dynamic processes that influenced broadly defined entrepreneurial behaviors of faculty members. For the purposes of this study, the researcher explored aspects of the model associated with the academic work climate of entrepreneurial professors, aspects of the model pertaining to departmental, and disciplinary environments, and individual working style attributes.

The dynamic systems model of academic entrepreneurship demonstrated that faculty creativity and entrepreneurship must be viewed in the context of disciplinary, sub-specialty and institutional factors, in addition to being a manifestation of individual creative and entrepreneurial talent. Expectations within specific institutions and institution types, and in subspecialties influence how individual faculty members will seek to produce creative breakthroughs within their field of interest. Faculty will attempt
to produce novelties and engage in entrepreneurial behaviors, but will do so within the context of disciplinary and institutional constraints.

The Dynamic Systems Model of Academic Entrepreneurship (Illustration 1) is presented on the following page.
Illustration 1: Conceptual Model

DYNAMIC SYSTEMS MODEL OF ACADEMIC ENTREPRENEURSHIP

ACADEMIC DEPARTMENTS WITHIN A SPECIFIC COLLEGE OR UNIVERSITY
- Workload
- Leadership
- Prevailing norms and culture
- Reward structure
- Physical environment conducive to creativity and entrepreneurship

Influences behavioral norms. Makes demands on time of faculty. Contributes to entrepreneurial environment.

ACADEMIC ENTREPRENEUR
- Consistent unconventional, innovative and creative approaches
- Demonstrated record of academic productivity
- Interdisciplinary research
- Collaborative arrangements with faculty
- Establishing and managing organized research units
- Exceptional ability to obtain resources
- Commercializing ideas
- Starting and operating a business
- Earning supplemental income

Produces novelties and has varying inclinations toward entrepreneurship.

ACADEMIC FIELDS
- Nature of discipline
- Opportunities
- Norms of field concerning relationships with external environments

Role in determining boundaries of acceptable entrepreneurial behaviors and innovations.

INDIVIDUAL COLLEGE OR UNIVERSITY
- Type
- Policies
- Leadership
- Reward Structures
- Climate
- Facilities

Creates a climate that encourages or discourages entrepreneurship.

INDIVIDUAL CHARACTERISTICS
- Working style
- Sensitivity to environments
- Social Knowledge
- Career stage
- Interpersonal skills
- Competency
- History
- Personality
- Risk-taking
- Self-confidence
- Creativity
- Opportunistic
- Motivation factors

SOCIETAL AND OTHER ENVIRONMENTAL INFLUENCES
- Proximity to markets
- Local community
- Politics
- Zeitgeist
- Economy
- Preferences of business, industry, and other agencies
- Public debate of role of higher education
- Societal demands

Makes demands of disciplines, institutions, departments, and individuals. Affects context of and opportunities for entrepreneurship.

Adapted from Csikszentmihalyi, 1988; Gartner, 1985; Johnson, 1985; Blackburn and Lawrence (1995)

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CHAPTER THREE: METHODOLOGY

Introduction

This study used research principles associated with a mixed methodology design. The dominant research form was exploratory multiple case study research. Secondary methodology emphasis was quantitative, using descriptive statistics from interview and questionnaire responses, especially relating to similarities and differences among disciplinary domains. Arts and Sciences faculty at a Carnegie classification doctoral/research intensive university, and a review of selected documents represent study data sources.

The exploratory nature of the topic, specific research questions, multiple literature bases, and a conceptual model that suggested multiple, dynamic and interactive phenomena that influence individual academic entrepreneurial behaviors, are factors that influenced a decision to use primarily a qualitative methodology for this study. A desire to obtain data from highly entrepreneurial faculty through a purposeful sampling technique also indicated that case study methodology was appropriate as the dominant form of research methodology. Certain behaviors and working styles of nominated academic entrepreneurs and the characteristics of the environments they negotiate and shape could be quantified. Data obtained through the questionnaires and interviews were summarized and categorized in the data reduction process. Many of the questionnaire items were designed to collect data to provide consistent responses within targeted response categories. The questionnaire represented one category of the three types of data collection instruments for the study.
Interviews and a review of curriculum vitae and a limited number of documents represented the two additional categories of study instrumentation. Using multiple data collection techniques or study instruments reflects the triangulation of data, a well-established procedure associated with case study qualitative inquiry (e.g. Creswell, 1994, 1998; Glesene & Peshkin, 1992; Lincoln & Guba, 1985; Stake, 1995; Yin, 1994). Triangulation of data is a valuable way of seeking convergence of data, a research technique associated with qualitative research, that refers to a process of seeking the same type of information from multiple sources. Information on related topics that is obtained from multiple sources is useful in confirming patterns of data or corroborating study evidence, and contributes to increasing study credibility, trustworthiness and validity (e.g. Creswell, 1994, 1998; Lincoln & Guba, 1985; Stake, 1995; Yin, 1994).

The case study methodology provided an opportunity to simultaneously accomplish some level of depth for each individual, as well as some breadth of exploration of experiences of academic entrepreneurs from different disciplinary domains. There are three levels of cases for this study. Each of the seventeen academic entrepreneurs interviewed represented a mini-case. The three sub-categories of the arts and sciences division of the study institution natural sciences, social sciences, and arts and humanities represented the second level of case. The arts and sciences faculty is the third and broadest level of case for this study. Stake (1995) refers to case study research with multiple cases as a collective case study. Since the phenomena of entrepreneurial working styles and work environment conditions influence entrepreneurial behaviors, the researcher’s approach to case study research could also be described as instrumental case study research. Stake (1995) distinguishes instrumental case study research from
intrinsic case study research by suggesting that with intrinsic case studies, the multiple aspects of the individual case itself is of greatest research importance, whereas with an instrumental case study research, the individual cases represent an expression of a larger phenomenon that is being studied.

Some of the readings the researcher encountered when reviewing the literature for this topic included case study references to well known business entrepreneurs. Moreover, the case study approaches of several scholars interested in the lives of creative individuals have influenced the methodology selection, and general approach to the topic. Csikszentmihalyi’s approach to interviewing highly accomplished creative individuals, reported in *Creativity: Flow and the Psychology of Discovery and Invention*, substantially influenced the researcher’s thinking, as did Shekerjian’s case studies of the creative individuals who have been awarded MacArthur Fellowships that she described in *Uncommon Genius: How Great Ideas are Born*. MacArthur fellowship guidelines stated that fellowships are awarded to “talented individuals who have shown extraordinary originality and dedication to their creative pursuits, and a marked capacity for self-direction” (MacArthur Foundation, 2001, p. 1).

Two additional works that were helpful in considering the attributes the researcher was interested in understanding within academic entrepreneurs, broadly defined to include a working style associated with creativity, innovation, and innovation, are Gardner’s (1997) *Extraordinary Minds: Portraits of Exceptional Individuals and an Examination of Our Extraordinariness*, and Bennis and Biederman’s *Organizing Genius: The Secrets of Creative Collaboration*. These two works were based on historical

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information relating to individuals and groups whose individual and collective contributions substantially changed their knowledge domains or fields. Amabile's work (1988, 1995, 1996, 1997) concerning creativity within individuals and in organizational contexts and the instrument she developed to assess perceptions of organizational climates for creativity was helpful in formulating questions concerning the type of environmental conditions that may inhibit or enhance the work of faculty members.

Limitations of the Study

The case study data for this study are not generalizable to other samples of professors at this or any other institution. The findings apply only to professors included in the study. The qualitative case study approach utilized sample selection procedures and data analysis procedures that did not include a random sampling process or data analysis utilizing inferential statistics.

The nomination process to identify study participants for this primarily qualitative study represented a purposeful sampling technique. Comparisons of nominated entrepreneurs to individuals who were not nominated were not made. Accordingly, the researcher cannot state how nominated entrepreneurs differ from individuals not readily nominated as an entrepreneur. Random sampling and inferential statistics were not part of the study methodology. The themes emerging from the study are not generalizable to a larger population. Professors from different knowledge areas share common attributes, and express working styles that may evolve over time and depend on current conditions and interests. However, since the study utilized a conceptual framework, and with a structured research design that included detailed documentation of the nomination
process, data collection and data analysis procedures, the themes could be explored using a similar research methodology involving different types of institutions, academic departments and disciplines. The interview questions and data obtained from the responses could be used in identifying questions that could be examined in a quantitative study of academic entrepreneurs.

Primary difficulties of the study related to decisions that were made in operationalizing the data collection. A desire to move forward with the study after an initial data source would not participate in the way the researcher planned, led to difficult data collection decisions. The pilot study institution became the primary source of data. That institution was a rich source of data. The institution has a reputation of emphasizing teaching excellence. A greater research culture has been emerging in recent years. The tension caused by balancing teaching emphasis and research excellence and productivity contributed to making the study institution an interesting choice of study institution. While all of the pilot study participants agreed to participate, not all of the participants provided all of the information requested. Since the researcher needed to conclude the data collection process, data analysis proceeded without reviewing exactly the same information for all participants. The researcher became concerned that repeated requests for information would cause some participants to withdraw from the study.

The data analysis process was an iterative one. Categorization of data points forced the researcher to make many reviews of data points, and provided greater assurance that the themes presented accurately characterized the data. Difficult judgments had to be made concerning categorization of data. Some points could have
been categorized differently, given the complexity and at times contradictory statements made by participants. Themes were based on organizing participant responses on topics in which they may have provided different levels of depth. Topics that professors discussed in detail were easy to categorize. Other topics may have only received a brief mention, providing less assurance of how to categorize the response. However, the statements of professors made in context and reported in the cases are helpful in reinforcing the accuracy of the themes that emerged from data analysis.

The complexity and diversity of the disciplines represented, and the complexity of professors, made cross-case analysis and determining distinctions among broad knowledge areas difficult. Greater balance among total numbers of participants for each broad knowledge area could have helped in the process of making distinctions among the broad areas. Although the researcher attempted to make distinctions among the three broad knowledge areas, the uniqueness of the disciplines and individuals represented made it difficult to identify common areas within a knowledge area that could be contrasted with the other two knowledge areas. The arts and humanities area only included four participants. Those individuals represented interesting disciplines. However, the perspectives concerning the entrepreneurial and creative working styles of an artist, another music professor, and a creative writer could have made the distinctions among broad knowledge areas sharper. It was difficult for the researcher to assert, with confidence, some of the knowledge area distinctions. However, as the data tables and discussion of themes reveals, on many categories of information identified as important to the study, there were consistent responses among most study participants.
In reporting findings, the researcher balanced respect for study participants and the study institution with researcher independence. Attempts were made to develop appropriate rapport and trust with professors. Concerns about anonymity and how the data would be reported may have been important to some study participants, and not to other participants. The extent to which professors spoke honestly and openly concerning their working style and conditions that influenced their behaviors is unknown. The researcher attempted to accurately report statements from cases in the context in which they were made. Extensive review of data points and the presentation of cases minimized the possibility of errors in interpreting the data.

Statement of Bias

The researcher believes entrepreneurial behaviors by faculty are an important and complementary means of expressing creative behaviors that advance individual scholarship. While overall higher education structures, cultures, climates, and policies reflect a strong orientation toward advancing creativity, innovation, and entrepreneurial behaviors, there are many legitimate researchable questions relating to aspects of higher education environments that may inhibit those behaviors. Academic entrepreneurs may utilize principles associated with individual and organizational creativity to negotiate and shape their environments. Notwithstanding this optimistic perspective on the topic of academic entrepreneurship, the researcher believes that providing optimal conditions for entrepreneurial behaviors by faculty may have consequences for other functions within a college or university. Balancing individual needs and desires for optimal work productivity is appropriately considered in the context of institutional priorities. The researcher has an interest in and appreciation for innovation, cutting edge creative and
entrepreneurial behaviors, and a respect for disciplined, traditional approaches to scholarship.

Sample

A purposeful sampling technique was used to identify individuals who could provide insights concerning the behaviors and organizational climates that are associated with academic entrepreneurship. Purposeful sampling is necessary and appropriate for exploratory case studies to obtain study participants who express a range of behaviors that are associated with a broad definition of academic entrepreneurship. To identify and describe the specific type of purposeful sampling techniques the researcher would use, the researcher reviewed Miles and Huberman’s typology of sixteen strategies for purposeful sampling (Miles & Huberman, 1994 cited in Creswell, 1998) in which they review purposeful sampling techniques that have been identified by researchers. The sampling approach the researcher chose relied heavily on the judgment of nominators who were aware of the working styles of faculty they considered entrepreneurial. Sampling for this study also reflected aspects of criterion, and stratified purposeful and extreme case sampling. Criterion sampling applied to the study since the researcher provided nominators with guidelines of behaviors that reflected loose criteria upon which to nominate faculty for the study. A stratified purposeful sampling technique is applicable since the researcher asked nominators to provide names of faculty from three areas of arts and sciences -- social sciences, arts and humanities, and natural sciences. Extreme or deviant cases is an applicable purposeful technique since the researcher asked for faculty who were highly entrepreneurial or exceptional in their entrepreneurial operating style.
Nomination Process

A mechanism was necessary to identify individuals who are entrepreneurial within the researcher’s broad operational definition of an academic entrepreneur. The dean of arts and sciences and associate provost for academic affairs of the study institution were contacted to request their assistance with the pilot study. The researcher provided them with study materials, including nomination guidelines, and met with them individually to describe the topic. The nomination guidelines included active engagement in consulting, developing centers, institutes, or other programs, interest and/or success in obtaining patents and licensing of ideas, starting and operating a business, and consistent success in obtaining resources through grants, and contracts with government and other organizations, as well as consistent use of unique teaching methodology. An additional guideline included a demonstrated track record of academic productivity, both quality and quantity, that is consistently above departmental or disciplinary norms. Appendix B of this study includes the guidelines for the nomination of study participants. The researcher also requested names of professors to participate in the pilot study.

The two academic administrators performed a gatekeeper role. Gatekeepers are individuals who are members of the organizational setting in which the study will be conducted. They are individuals with insider status within an institutional culture. The gatekeeper represents the initial contact within an organization and leads the researcher to other individuals who provide information relative to the case or cases. The importance to the credibility of a qualitative study, and the specific functions of a gatekeeper are
frequently cited by qualitative researchers (e.g. Creswell, 1994, 1998; Stake, 1995; Yin, 1994).

Of the twenty-three names provided by the two academic administrators, four names were included on both lists. After completing the pilot study, described later in this chapter, and exploring another study institution, the researcher determined in consultation with the committee chair, that it would be appropriate to use the pilot study institution for the study. The two academic administrators were advised of the researcher’s intention to do so, and given the opportunity to notify the researcher with any problems or concerns.

Instrumentation

The instruments for this study included the following: nominated entrepreneur questionnaire, nominated entrepreneur interview protocol, and review of selected documents. The data collected from these instruments were analyzed in order to answer the study research questions presented below.

Research Questions

1. What are the characteristics of academic work climates that promote or inhibit entrepreneurial behaviors?

2. What are the key facilitators and barriers to engagement in entrepreneurial behaviors by faculty at a selective doctoral/research university?
3. How do highly entrepreneurial faculty negotiate and shape their environments to create conditions that enhance their work performance?

4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain?

Table 1 included on the following page generally indicates which of the study instruments were used to answer which research questions. It includes references to specific question numbers from the questionnaire and interview protocol that were used to answer the research questions. Following Table 1 is an explanation of each study instrument. The questionnaire and interview protocol are included in Appendix G and Appendix H.
<table>
<thead>
<tr>
<th>Research Questions and Categories from Conceptual Model</th>
<th>Instrument(s) and Specific Questions Used to Answer Research Questions</th>
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<tbody>
<tr>
<td><strong>Working Styles</strong> (Behaviors of Academic Entrepreneurs)</td>
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</table>
| 1. What are the characteristics of academic work environments that promote or inhibit entrepreneurial behaviors? | Questionnaire 10, 11, 12  
Interview 7, 8, 9, 10  
Document Review |
| 3. How do highly entrepreneurial faculty negotiate and shape their environments to create conditions that enhance their work performance? | Questionnaire 5, 6, 7, 8, 9  
Interview 1, 2, 3, 4, 5, 6  
Document Review |
| 4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain? (behaviors of academic entrepreneurs part of question) | Questionnaire 5, 6, 7, 8, 9  
Questionnaire 12, 13, 14, 15, 16, 17  
Interview 1, 2, 3, 4, 5, 6  
Interview 11, 12, 13, 14, 15  
Document Review |
| **Organizational Conditions** (Academic Department, Institution, Society, Other) |                                                                                |
| 1. What are the characteristics of academic work environments that promote or inhibit entrepreneurial behaviors? | Questionnaire 10, 11, 12  
Interview 7, 8, 9, 10  
Document Review |
| 2. What are the key facilitators and barriers to engagement in entrepreneurial behaviors by faculty at a selective doctoral/research university? | Questionnaire 9, 10, 11, 12  
Interview 7, 8, 9, 10  
Interview 11, 12, 13, 14, 15  
Document Review |
| 4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain? (key facilitators and barriers part of question) | Questionnaire 10, 11, 12, 13, 14, 15  
Interview 7, 8, 9, 10, 11, 12, 13, 14, 15  
Document Review |
| **Disciplinary Context** (Knowledge Domain Academic Field/Discipline) |                                                                                |
| 4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain? (key facilitators and barriers part of question) | Questionnaire 10, 11, 12, 13, 14, 15, 16  
Interview 7, 8, 9, 10, 11, 12, 13, 14  
Document Review |
| 4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain? (behaviors of academic entrepreneurs part of question) | Questionnaire 6, 7, 8, 9, 12, 13, 14, 17  
Interview 1, 2, 3, 4, 5, 6  
Interview 11, 12, 13, 14, 15  
Document Review |
| 3. How do highly entrepreneurial faculty negotiate and shape their environments to create conditions that enhance their work performance? | Questionnaire 6, 7, 8, 9  
Interview 1, 2, 3, 4, 5, 6, 7  
Document Review |
Questionnaire

The seventeen nominated academic entrepreneurs were asked to complete a researcher-developed questionnaire. The purposes of the questionnaire were to collect information concerning the important activities of the nominated entrepreneur, and to collect information concerning key attributes of their individual working styles, including what they may do to overcome work-related obstacles. It was also used to collect general background information to assist in making comparisons among the broad knowledge domains.

The questionnaire items were formulated to obtain responses to answer the general research questions. They were written with the general research questions, relevant literature, and the conceptual model of academic entrepreneurship as guides. The questionnaire items were grouped in the following categories: background questions; working style; departmental and organizational conditions and climate; academic entrepreneurship context; and knowledge domain influences. The questionnaire was designed for nominated entrepreneurs to complete providing short answers or by choosing among response choices. It provided an opportunity for study participants to begin thinking about their entrepreneurial behaviors and attributes of their work climates influencing those behaviors.

The nominated academic entrepreneurs were asked to complete an Informed Consent form prior to completing the questionnaire. A copy of the Informed Consent form is included as Appendix E. Nominated entrepreneurs were asked to complete the questionnaire prior to the interview. The questionnaire was hand delivered to
participants. An electronic mail version of the questionnaire was also provided and the researcher suggested that it may be more convenient for questionnaire responses to be returned to the researcher by electronic mail. Five questionnaires were returned via electronic mail. The questionnaire provided a general understanding of the working style and general behaviors of the nominated entrepreneurs before interviewing them in those cases where questionnaires were returned prior to the interview.

Interview Protocol

The purpose of the approximately one-hour interviews with the nominated entrepreneurs was to enable study participants to provide greater in-depth detail than provided by the questionnaire concerning their behaviors, working styles, and the organizational climate influencing their entrepreneurial behaviors. For those study participants who did not complete a questionnaire, the interview and curriculum vitae represented the primary sources of data. The general research questions, relevant literature, and conceptual model of academic entrepreneurship guided development of the open-ended interview questions. The interview protocol provided a guiding script concerning statements the researcher made at the start and conclusion of the interview, and included specific interview questions. Interview questions were categorized by individual working style, departmental and organizational climate, and knowledge domain influences. Numerous question probes were included in the interview protocol to assist in obtaining elaboration from nominated entrepreneurs on important topics, and to guide the conversation to produce information. Creswell’s discussion of components of the interview protocol such as headings, opening statements, questions, probes, space to
record interviewee observations, and reflective notes influenced the development of the interview protocol (Creswell, 1994, 1998).

Document Review

The document review for this study included review of the curriculum vitae for each nominated entrepreneur, and review of a limited number of university documents intended for either internal and/or external audiences. The vitae provided important information concerning major areas of teaching, research, and service. They also provided information concerning professional activities that may have been emphasized during different career stages. Vitae review provided background information in preparation for interviewing professors. Moreover, the vitae helped decision-making concerning possible additional topics to discuss during the interviews.

The researcher reviewed policies and procedures that guide the behaviors of individual faculty members. Most of those guidelines are contained in the faculty handbook. Policies reviewed that have some influence on setting the institutional environment for the academic entrepreneurs in the study included policies relating to tenure, promotion, and merit review, as well as policies relating to outside employment and consulting policies, intellectual property, teaching loads, and academic released time.

Review of internal and external sources of media material helped the researcher understand how the institution is promoted. A few of the documents included in the review were the institution’s ten-year self-study, a summary of the institution’s strategic plan, the institution’s viewbook, and university catalog. The institution’s internal
publication that features the accomplishments of faculty, students, and administrators, as well policy and budgetary matters, was reviewed regularly. This publication was useful since the achievements of faculty that are publicized may represent an expression of strongly held common values of institutional representatives. During the study period, the publication featured stories concerning the work of several of the study participants.

The general review of documents helped the researcher understand the institutional context in which the professors worked. The documents provided an indication of the general organizational climate and cultural values of the study institution. The document review provided a broad overview of the types of organizational structures and policies that influenced the behaviors of faculty. Published documents provided insights concerning behaviors that are highly valued within the university, and as such, provided clues to the overall institutional climate for entrepreneurial behaviors. Review of selected documents prior to interviews with nominated entrepreneurs helped the researcher anticipate areas in which there may have been strong opinions concerning enhancements and inhibitors to entrepreneurial behaviors.

Pilot Study

Pilot studies are important in case study research in order to make any necessary adjustments to instruments and general study methodology (e.g. Glesene & Peshkin, 1992; Stake, 1995; Yin, 1994). Six nominated arts and sciences academic entrepreneurs and two influencing individuals at a selective doctoral university participated in the pilot study. Three nominated entrepreneurs represented the social sciences, two represented the arts and humanities and one represented the natural sciences. The interviews with the

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nominated academic entrepreneurs took place during the summer of 2001 within a two-week time period. Two influencing individual interviews took place during the Fall, 2001. Five of the interviews were conducted in the offices of participating interviewees. One interview with a nominated academic entrepreneur and an influencing individual was conducted in a conference room. The interviews lasted from approximately thirty-five minutes to one and one-half hour.

Changes were made based on analysis of the pilot study process, and review of data obtained in the questionnaires and interview sessions. Only a minor change was made to the nomination process. Text of the operational definition of academic entrepreneurship was added to the nomination guidelines. The questionnaire instruments were changed to provide response options to several questions. Two questions were dropped from the questionnaire. In addition to adding response options, several questions were modified to enable participants to provide a Likert scale response. A final question was added to the questionnaire asking nominated entrepreneurs to provide names of influencing individuals or the names of individuals who were simply familiar with their working style. For those individuals who preferred that the researcher not contact anyone concerning their working style, an option was given for them to describe how an individual or two had influenced their working style. This final question was added given the researcher's detection of hesitation during the pilot study in individuals providing names of others who had influenced their working behaviors. This question was developed to give nominated entrepreneurs the option of letting the researcher speak with influencing individuals or simply providing information about individuals who had
influenced their behavior. The sequencing of questions was modified slightly on the interview protocol.

Concerning the interview protocol, a decision was also made to add probes, when necessary, to obtain information that was not provided on the questionnaire. Two of the pilot study-nominated entrepreneurs preferred that the researcher not tape record the interview session, and indicated that they would not talk as openly if the interview were tape recorded and transcribed. A decision was made to continue to request permission to tape record the interviews. However, a full transcript was not made for each nominated entrepreneur. Rather, the tape recordings were be used to confirm notes, verify points to make, and to identify quotes that were used in reporting data findings.

Data Collection Procedures

Data for this study were obtained primarily during the period of July, 2001 - March, 2002. The names were provided by two nominating administrators, associate provost for academic affairs, and dean of faculty of arts and sciences. The researcher met with those two administrators, described the study, and asked for names of individuals whose working style and work behaviors likely fit within the guidelines provided. The individuals the administrators provided were contacted requesting their participation in the study. A packet of materials that included an overview of the study, informed consent form, and a copy of the questionnaire were hand delivered to the offices of potential study participants. Of the twenty-three individuals requested to participate, seventeen agreed to participate. Eleven of the study participants agreed to participate
after the pilot study was conducted and six of the pilot study participants agreed to allow previously collected information to be used in the study.

The study data included eight representatives from social sciences, including one individual who is a center director and has taught classes as an instructor, but is not a tenure-track professor. Five natural scientists were included in the study, and the remaining four participants represented the arts and humanities. The researcher attempted to collect the same type of information for all of the study participants -- interview data, questionnaire data, and curriculum vitae (c.v.) data. Fourteen of the study participants allowed the interview to be tape-recorded. Partial transcripts of the interviews were made for those study participants. Thirteen questionnaires were returned, with twelve completed and the remaining one partially completed. A curriculum vita or some form of biographical information was obtained from sixteen participants.

In some cases several reminders were made requesting questionnaire information. The in-person interviews ranged from approximately forty-five minutes to approximately one and one-half hour in length. The same interview protocol was used for each interview. However, the amount of time spent on each question, including use of probes, and other follow-up questions varied for each interview. Two study participants preferred that the researcher interview them by telephone. Those same two professors did not complete a questionnaire. They did, however, provide a copy of their curriculum vitae. The researcher decided it was prudent to collect information on the study participant's own terms, even if it meant not obtaining their completed questionnaire or
conduct the interview in person, rather than risk the individual withdrawing from the study. After a relatively flat response was obtained during the pilot study concerning a component of the study to request participation by influencing individuals, a question was included in the questionnaire asking for the names of an individual the researcher could speak with concerning the study participant's working style and work environment. Since only six individuals provided information concerning individuals to contact, the researcher did not pursue data from influencing individuals.

The preceding information provides information regarding the extent of and type of data that was obtained, and provides information concerning the effort that was expended to consistently collect the same type of data from all participants. The fact that every participant would not work with the researcher in the same way, may reflect the reality of collecting information that could be perceived as sensitive data by some participants, the time constraints of study participants, and how study participants control their time.

Data Analysis Procedures

Yin (1994) maintained that the ultimate goal of data analysis "is to treat the evidence fairly, to produce compelling analytic conclusions, and to rule out alternative interpretations" (Yin, 1994, p. 103). According to Gall, Borg, and Gall, case study analysis involves a process of interpretational analysis. They suggested that "interpretational analysis is the process of examining case study data closely in order to find constructs, themes, and patterns that can be used to describe and explain the phenomenon being studied" (Gall, Borg, & Gall, 1996, p. 562). Procedures for data analysis included procedures relating to single case analysis, and cross-case analysis.
Cross case analysis refers to a process of identifying themes across individual cases in case study research involving multiple cases. The data analysis process included continuously re-visiting data, and flexibility in the sequencing of data analysis. Creswell suggested that in case studies “data analysis will be conducted as an activity simultaneously with data collection, data interpretation, and narrative reporting writing” (Creswell, 1994, p. 153). Overall, during the data analysis process, the researcher coded or grouped and re-grouped the data until the researcher was comfortable that the information was logically organized and evidence identified and reported to support the themes that emerged. This process is commonly referred to as data reduction.

The data for the study included the partial transcripts of interview sessions, completed questionnaires from thirteen participants, and curriculum vitae, or biographical information of the participants who provided information of that type. Some biographical information was obtained via departmental web sites. The analytical process the researcher used to prepare case summaries, and to look for similarities and differences among individual cases and the three broad areas of cases involved multiple stages. Data analysis techniques included aspects of the constant comparative approach to qualitative research since information was continuously grouped and re-grouped within and across categories. In the process, data were reduced to categories and themes.

The researcher utilized a procedure, commonly referred to as member checking, to confirm the accuracy of study data. Member checking is a qualitative research technique associated with ensuring that participant responses are accurately reported (e.g. Creswell, 1998; Gall, Borg, & Gall, 1996; Glesene & Peshkin, 1992; Lincoln & Guba,
1985; Stake, 1995). The researcher asked study participants to review the interview notes and questionnaire notes the researcher compiled, and to inform the researcher if they had any clarifications or corrections to the information they provided. Only one study participant sent a message to the researcher, asking that the researcher use sensitivity and discretion in reporting some information that this participant provided.

The researcher conducted a content analysis of data collected for each individual nominated entrepreneur. Gall, Borg, and Gall, defined content analysis as “the study of particular aspects of the information contained in a document, film, or other form of communication” (Gall, Borg, & Gall, 1996, p. 756). The process involved making a general review of materials that were provided including the questionnaires, and curriculum vitae, and partial transcripts for fourteen of the study participants. After completing the transcription process, the researcher prepared first drafts of individual case summaries. The transcription process and draft case summaries helped the researcher understand individual cases and begin to formulate preliminary observations concerning emerging themes. This analysis was captured in the form of a draft of themes resulting from analysis of cases within the categories of social sciences, natural sciences, and arts and humanities. This section of draft themes also included an attempt at determining categories of information that could reasonably be organized and reported. The analysis up to this point formed the framework or general structure for analysis that followed. The individual case studies were expanded, and refined throughout the remaining data analysis process.
The researcher used a process referred to as “chunking” that involved coding with colors, letters, or numbers or some other symbol system information to facilitate categorization, and continuously look for additional ways of grouping or re-grouping data. Creswell (1998) referred to an open-coding phase of analysis to describe the process in which the researcher “examines the text (e.g. transcripts, fieldnotes, documents) for salient categories of information supported by the text” (Creswell, 1998, p. 150). In that process, the constant comparative approach is utilized in looking for instances of data that may fit a given category (Creswell, 1998). The researcher continuously reviewed pieces of information to make determinations about the appropriate major categories and subcategories to which the information logically fit.

During the process of data reduction to identify appropriate categories to describe the data, the researcher used a process referred to a categorical aggregation. Categorical aggregation is an “aspect of data analysis in case study research where the researcher seeks a collection of instances of the data, hoping that issue relevant meanings will emerge” (Creswell, 1998, p. 249 citing Stake, 1995). In the process of grouping and re-grouping data for within-case analysis, the researcher looked for quotes to use in reporting data analysis to illustrate behaviors, working climates, and general working styles of the academic entrepreneurs, and to add depth and richness to the results reported.

During the cross-case stage of data analysis, the researcher used coding or grouping procedures. This stage involved comparing and contrasting individual cases with other cases. The data analysis conducted within the individual case stage of data
analysis was used and complemented with additional data analysis. In this way, cross-case analysis built upon individual case analysis. Cross-case analysis involved some experimentation by the researcher with a process for comparing individual cases. A key aspect of this stage of data analysis was taking the data summaries from individual cases and from additional insights of comparing individual cases, and identifying themes and patterns among cases. Identification of study themes reflects a refinement of data from the broader categorization of data. Stake refers to patterns as “an aspect of data analysis in case study research where the researcher establishes patterns and looks for a correspondence between two or more categories to establish a small number of categories” (Creswell, 1998 citing Stake, 1995, p. 251). Gall, Borg, and Gall, (1996) define themes as “salient, characteristic features of a case” (p. 549).

Throughout the phases of the data analysis process, including grouping of responses, the researcher considered the research questions and conceptual framework. The cross-case analysis was valuable in answering research questions relating to differences among broad knowledge domains in areas such as types of behaviors, organizational conditions, and working styles. Cross-case analysis revealed areas that many of the academic entrepreneurs participating in this study had in common, as well as attributes that appeared unique to individual participants. Based on the research questions, and questions presented in the interview protocol and questionnaire, and on analysis up to that point, the researcher determined that four broad categories could be used as a starting point for organizing data. Those categories were: organizational conditions/climate, working style, disciplinary attributes/culture, and work products. The researcher recognized that there would be overlap of data points for these categories, and...
that many data points could be categorized in one or more of the broad categories. The researcher coded the partial transcript notes, and questionnaire notes into data elements into one or more of the four broad categories, and into one of the three broad knowledge areas. The researcher also coded each data point with the initials of the individual making the statement.

The researcher created a stack of data points for each broad category by cutting into strips of paper each of the color coded broad categories. Since by this time, the researcher had a good idea of how the data presented could be categorized, the researcher made a preliminary list of possible subcategories for each of the four broad categories. However, the researcher did not want to prejudice the process of identifying subcategories, and re-shuffling of categories that emerged, and therefore did not automatically assign the data points for each of the four broad categories to the preliminary list of subcategories. Next, the researcher took the data points from the strips of paper and one by one decided how the data point could be labeled. As the researcher went through the strips of paper, subcategories emerged, however. At this point, the researcher decided to err on the side of making many subcategories.

The next step in the data analysis process involved a procedure of taking the subcategories of each of the four broad categories, and separating the data points by the three broad areas of knowledge; social sciences, natural sciences, and arts and humanities. During this stage the researcher also consolidated many of the subcategories into other existing subcategories. Information that the researcher thought represented a theme, or could in some way be counted for each broad category, as well as data points
that represented strong quotes for the cases or in supporting the conclusions, was noted on a preliminary matrix. The researcher took information from the preliminary matrix, and incorporated it into the preliminary analysis. Data analysis was further refined in the process of expanding cases, and in developing the tables of data points that are included in Chapter Four. As the data analysis process evolved, the researcher organized the individual case summaries with sections including working style, organizational conditions, and disciplinary context.

After going through the process of categorizing and re-categorizing, and separating by broad knowledge areas, the researcher realized that all of the data points did not lend themselves to simple categorization. Overall, however, the researcher was satisfied that a multi-stage data analysis process was used that forced the researcher to handle each data point multiple times. Multiple consideration of each data point helped the researcher treat the data fairly, and comprehensively. It also helped the researcher identify aspects of the cases, in which a point may have been made directly only by one or two participants, but where related statements were made by other participants giving greater credence to labeling an attribute, behavior, or condition as a theme.

The researcher acknowledges, however, at times the researcher was influenced by forceful statements, or statements made so eloquently about a discipline, department, or the institution, that it was difficult not to have some sense that the statement could apply to other participants, even if they did not make it directly. For example, in discussing inhibitors to his work environment, one professor indicated “parking, damn it” was a complaint or minor annoyance that could negatively influence his work climate.
Although, he was the only professor to mention parking as an inhibiting factor, an argument could be made that it is likely that other professors, especially within his department, were affected by the same phenomenon. The point of that illustration is to suggest that the researcher attempted to cite evidence for themes, and minimize speculation in presenting the conclusions, but there is some element of judgment other than explicit categorization of like statements, that has influenced how the researcher viewed the study participants, and their work environment. The difficulty of categorization of statements is one reason why the key to understanding the operating styles, and working conditions of study participants lies in understanding the individual cases, and letting the reader contemplate whether similar conditions may also affect other participants.

Illustration 2 on the following page provides a summary of key study elements.
**Illustration 2: Key Study Elements**

### General Methodology

Primarily exploratory multiple case study qualitative research, with quantification of some questionnaire responses.

### Purpose

To obtain insights concerning the attributes of work climates that inhibit or enhance entrepreneurial behaviors of faculty, and to understand how academic entrepreneurs actively negotiate and shape their environments. An additional purpose of this study was to understand how opportunities to pursue certain entrepreneurial activities may differ by knowledge domains.

### Conceptual Frame

The researcher used a model adapted from scholars of business entrepreneurship, creativity and higher education. The model suggests dynamic and interactive influences upon behaviors of an academic entrepreneur. Broad categories of the model include individual characteristics, academic fields, individual college or university, specific academic department or sub-unit and society at large.

### Academic Entrepreneur Traditional and Expanded View

- Consistent unconventional, innovative and creative approaches to research, teaching, and service.
- Demonstrated record of academic productivity – both quantity and quality above departmental or disciplinary norms.
- Exceptional ability in obtaining resources – sensitivity to market forces.
- Commercializing ideas.
- Starting and operating a business.
- Earning supplemental income as a consultant.
- Establishing and managing an organized research unit.
- Collaborative arrangements with faculty on cross-disciplinary projects.
- Developing and/or early adoption of novel instructional technologies.
- Exceptional skill in negotiating departmental and institutional bureaucracies and policies.
- Productivity with respect to publishing and presentations before professional associations.

### Literature

(Scholars influencing researcher approach to topic)

- Amabile
- Bird
- Blackburn and Lawrence
- Csikszentmihalyi
- Slaughter and Leslie
- Fairweather
- Shekerjian

### Problem

Academic entrepreneurship, broadly defined, is a topic of current interest and controversy within American higher education. In order to understand its implications, it is valuable to understand the climates that promote or inhibit entrepreneurship as well as how highly entrepreneurial faculty negotiate and shape their environments. The stories of individual faculty members may suggest areas in which aspects of institutional climates may unintentionally or intentionally inhibit entrepreneurial behaviors.

### Sample

- Purposeful
- Arts and Sciences Academic Entrepreneurs nominated by Dean and one other academic administrator
- Eight social sciences faculty members
- Four arts and humanities faculty members
- Five natural sciences faculty members

### Instrumentation

- Researcher developed questionnaire.
- Interviews with nominated professors.
- Content Analysis of Curriculum Vitae.

### Research Questions

1. What are the characteristics of academic work climates that promote or inhibit entrepreneurial behaviors?
2. What are the key facilitators and barriers to engagement in entrepreneurial behaviors by faculty at a selective doctoral/research university?
3. How do highly entrepreneurial faculty negotiate and shape their environments to create conditions that enhance their work performance?
4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain?
CHAPTER FOUR: INDIVIDUAL CASES

Introduction

This chapter presents data that were collected in interviews, questionnaires, and curriculum vitae. The chapter begins with an overview of general characteristics of the data. A case summary is presented for each of the seventeen study participants. The eight social scientists are presented first, the four arts and humanities professors presented next, and the five natural scientists presented last. Seven tables that were developed as part of the data analysis process are included after the individual case summary section. The tables were developed using the curriculum vitae, questionnaires, and interview responses. To ensure the accuracy of the data and their interpretation, the researcher conducted member checks with all professors. The researcher sent interview and questionnaire notes by electronic mail to study participants. Only one professor’s reading of the transcripts yielded a slight modification in the case study summaries that follow. Not all of the professors responded to the researcher’s request for feedback concerning whether the transcripts were accurate.

The case summaries illustrate the attributes and influences upon the working styles of individuals identified as exhibiting behaviors that may fit a broad definition of qualities of academic entrepreneurs. Given familiarity with this topic from pre-dissertation research, and a review of the literature relating to aspects of this study, the researcher had certain expectations prior to beginning this exploratory research. Nevertheless, consistent with case study methodology, throughout data collection and analysis, the researcher was alert for potential contradictions. Furthermore, since the concept of entrepreneurship, especially in an academic context, is subject to disagreement over exactly what fits appropriately in the definition of entrepreneurial behavior, the
researcher attempted to identify behaviors that may be described as entrepreneurial broadly and narrowly defined, and identify those conditions that may promote or inhibit those behaviors. An operating principle for the researcher in analyzing the data was to identify the activity or activities that most encapsulated an entrepreneurial spirit, and to understand conditions that facilitated or impeded general productivity.

All participants were asked to complete a questionnaire, provide a curriculum vita, and answer exactly the same interview questions. Therefore the data presented reflect a composite of the data obtained for each individual. The data should be interpreted recognizing the constraints presented, using a limited sample within the three broad areas of arts and sciences considered for the study. This information is most useful in obtaining a general snapshot of arts and sciences professors included in this study. The case study data are not generalizable to other samples of professors at this or any other institution.

The researcher followed the interview protocol closely, and collected questionnaires from study participants. However, all participants did not answer questions in the same depth, and some did not complete the questionnaire. Invariably and appropriately as unique individuals, the professors explored topics that either were important to them, or represented their interpretation of the type of data the researcher was interested in obtaining. The researcher worked to develop positive rapport with participants, but, given the sensitive nature of some of the questions, there were some topics that individual professors were more willing to explore than others.
The seventeen cases presented represent a summary of the information obtained about how professors approached their work, and the departmental, institutional, and disciplinary attributes that facilitated or inhibited their work. The researcher attempted to highlight work that is routine and work that professors suggested may have been the basis upon which they were considered entrepreneurial. The thick description of cases contain liberal use of quotes, and statements concerning the context to highlight the complex, multiple, subtle, sometimes conflicting influences upon professors.

Demographics of the Case Study Sample

Fifteen study participants were post-tenure, with one individual pre-tenure and the remaining study participant non-tenure track. Three study participants have held tenure for five or fewer years. Six of the participants have been at this institution for ten or fewer years, and eleven participants employed by the study institution for ten or more years. Of the tenured professors participating in the study, ten hold the rank of full professor and/or department chair. Seven professors hold an endowed chair or some type of "named" professorship. A doctor of philosophy degree was the highest degree earned for sixteen of the participants. The remaining participant is currently enrolled in a Ph.D. program. An informal definition of career stages for study participants was identified: pre-tenure to five years post-tenure represents early career stage, six-twenty years post-tenure or non-tenure track/unique situation represents mid-career stage, and more than twenty years post-tenure represents late career. The study participants fell into the following categories: five early career, eight mid-career, and four late career. These general characteristics of the study participants reveal a study sample that is heavily mid
to late career with strong representation of full professors. Thirteen study participants were male and four were female.

Demographics of the Institution

The study institution is one of the oldest in the nation. It has approximately 5,000 undergraduate students and 2,000 graduate students. Its history and the historical character are prominently featured in the institutional materials. The institution promotes itself as a place where professors value, and are actively engaged in, first class research, but where an atmosphere of human scale is also important. Most undergraduate courses are taught by tenure-track or tenured full-time faculty. Use of teaching graduate assistants is not common in most departments. The institution is situated in a small to medium-sized community with a population of the city and surrounding counties of approximately 60,000. Major urban centers are located within an hour or two drive of the institution. Representatives of the study institution are actively involved in helping shape the quality and character of the local community.

This study was completed during a time period of national and regional economic recession. Given signals from the state legislature, the university was operating in period of retrenchment from a state revenue perspective. A hiring freeze had been initiated, with academic searches for academic positions moving forward on a case by case basis. Department representatives were asked to look for ways of reducing their budgets in anticipation of a reduction in operating funds from the state over the next several fiscal years. Central administrators were leading budget discussions on campus that included options of reducing faculty and staff positions, phasing out a limited number of academic
programs, and reducing or closing other programs and services. Raising student tuition was also being discussed as a way of recouping part of reductions in state funding. Occurring simultaneously, however, the possibility of major capital improvements to many academic buildings seriously in need of upgrades was being discussed in the state legislature. The institution was also in the early stages of a major fund raising campaign. The study institution experienced increases in overall total grants and contracts awards in the most recent fiscal year. During the data collection period, several grants were made to the institution with values greater than $1 million. Some of those grants will involve the work of study participants.

Professor A - Social Sciences

Background Information

Professor A is the director of a multi-faceted center, and an associate professor of government. He has been employed by the study institution for twenty-one years beginning as an assistant professor. Since Professor A began his role as director of the center, his time has been devoted substantially to the administrative role of initiating and developing programs and projects benefiting students and faculty. Approximately seventy percent of his time is devoted to center activities. As the center evolved, important representative programs and projects included participation in the development of the university-wide freshman seminar program, facilitating or overseeing inter-disciplinary majors, coordinating student scholarship programs, coordinating faculty development programs, and promoting the development of numerous centers, some of which are inter-disciplinary. Several programs can date their beginnings to the center, and have since spun completely out of the center, include programs in public policy,
American studies and international studies. Professor A holds a tenured position within the government department, has some limited teaching responsibilities, and conducts some of his own original research. He received an institutional teaching award in 1985. One of Professor A's nominators referred to him as reflecting entrepreneurial behaviors long ago by stepping out of a traditional academic role and serving as center director. As the first center director, Professor A indicated that he has built the "environment here to be entrepreneurial. That's its whole reason for being."

**Working Style**

Professor A sees his center, and his role within the center, as relating to identification and incubation of innovative programs. The Center represents a research and development or start-up place. His ideal model of center operations is for the center to be a place to create new programs and once they are created to convey managerial ownership to others. The center has a simple infrastructure of just three or four people, and is not in a position to manage many programs. Professor A suggested that the concept of the center is unique in that the center is an incubator and not a manager of programs. In that sense "the whole thing is entrepreneurial." Professor A acknowledged that over the years some programs were less successful because of lack of faculty or student interest. He suggested creating new programs is easier than closing unsuccessful ones. He compared closing programs to moving a cemetery..."It just never happens because there is a vested interest."

A typical workweek for professor A involves one or two big projects, which he refers to as "the crisis of the week." Projects of that type may include a grant proposal,
or some other proposal, a deadline for summer scholarships, or Rhodes Scholar applications. Most weeks also involve many meetings with students and faculty. Professor A frequently organizes lunches to stimulate discussion among individuals working on a project. He is a firm believer in the “capacity of food to get people to be a little more relaxed, to get to know and trust each other.” Professor A promotes dialogue among potential faculty facilitating discussions concerning areas of linkage or collaboration for research and student activities.

Professor A indicated that he is a very early morning riser. He often starts work at 5 a.m. He enjoys the early morning hours, and he often uses that time to work on reports, grants or papers. Professor A indicated that he is not a late night person, but acknowledges that often he has to adjust his schedule when trying to work with people on different schedules. Professor A said “I am not a micromanager.” His preferred management style is “hiring or appointing good people, giving them the resources that they need, and turning them loose to take responsibility.”

Professor A maintained that “universities tend to be little feudal kingdoms where an individual takes responsibility for some area, and where there are not clear operating procedures.” He suggested that educational organizations are muddier than bureaucratic organizations and emphasize consensual decision-making and collegiality. Universities do not do things by a committee of one or two. Professor A maintained that consensus-building is important. His philosophy is “finding ways of doing things so everybody wins” and helping people see how everybody can benefit. That might mean making some compromises, but can help everyone achieve their goals. In directing the center, he
can organize people and facilitate the energy that already exists. In other more bureaucratic work environments one may have to make hard decisions where there are winners and losers. Professor A suggested that his best work is done when helping others achieve their goals.

Professor A used the illustration of the development of a university-wide freshman seminar program as an example of his entrepreneurial or innovative working style. Professor A performed multiple roles in the development of this program. Leading up to the development of the program, he chaired a committee that studied the freshman experience. His involvement in the project reflected a consensus-building style. He maintained that after seeing the data, faculty became enthusiastic about developing a program. Overall, his role was not one in which he imposed ideas or defeated opponents, but rather, was a matter of organizing energy over something the community believed in. Concerning this same program, he was the principal author of a National Endowment for the Humanities challenge grant that enabled university departments to obtain funding to support implementation of freshman seminars. Challenge grants brought $3 million to the institution for faculty support of the program.

Professor A has a record of building and managing an organization. Initiating something new is frequently associated with entrepreneurship. He also has a history of seeking resources to support center programs through various sources, such as grant funding and fund raising from individuals and corporations, as well as securing internal resources. He demonstrated an independent streak, common among entrepreneurs through his career choice to move away from a traditional academic role. His instincts
for collaborating with, and hiring competent people, as evidenced by his statements concerning his general working philosophy are also characteristic of many entrepreneurs.

Organizational Conditions

With respect to working conditions that facilitated his work, Professor A indicated that he believes his center has benefited from being slightly off the "beaten track". The center, for different programs, has had the interest and attention of different senior administration representatives, including the dean of arts and sciences, provost and president. Although, it is clear to him that he reports to the dean of arts and sciences, the center operates like an autonomous research and development center with little day to day supervision. Supervisors providing resources and trusting him or leaving him alone to act independently has benefited Professor A. As center director, he stated, "I have been given a lot of time, flexibility, and resources to try out new ideas and programs. The center was relatively new when I took over and relatively undefined, so I have been able to take it in directions I believe are profitable." In part, Professor A attributes his success to his efforts to build resources for the institution, and says that "the administration has been very good at not micromanaging me and not breathing down my neck. I report to the dean of arts and sciences, but for some programs that are university-wide my reporting responsibilities are vague." Budget freezes were suggested as a potential inhibiting influence upon his work.

Disciplinary Context

Professor A suggested that taking the position of center director meant a move away from his own research and toward administration. As a professor, this was
something that has represented more of what he did not think he would be doing and less of what he did think he would be doing. Regarding his disciplinary area, political theory with an emphasis on democratic processes, Professor A indicated that he is aware that universities represent democratic communities, and as such, the work he is engaged in within the university represents an applied application of his disciplinary area. Professor A noted that he is practicing his academic discipline at an administrative level. The democratic theory work he does involves creating programs that are democratic experiments. The programs imply students taking an active role in education, doing research, and being creators of knowledge; not just consumers of knowledge. Professor A speculated on why he may have been nominated as an academic entrepreneur by stating that the "center serves as an incubator for new ideas, experimental programs, and has met with success in areas of helping of faculty develop new programs, facilitating collaborative research, generating grant proposals, and helping faculty learn about and implement new teaching methods."

Some entrepreneurs are as interested in engagement in start-up activities and all of its complexities rather than necessarily making a long-term commitment to a specific new venture. Professor A’s tendencies toward initiating new programs and projects, and identifying other individuals or organizations to manage the programs reflects this entrepreneurial tendency. His observations concerning desire for autonomy or independence, and resources are common themes among entrepreneurs in many contexts. In characterizing Professor A concerning common themes among study participants, he neatly fits the researcher’s informal criteria for categorization of entrepreneurial study participants; a general entrepreneurial working style that may have a unique emphasis,
obtaining resources, center development, and some aspect of serving in an administrative capacity. Although not precisely defined in the study, a case could be made that professor A has been productive as center director. The single most unique attribute of Professor A’s working style in comparison to both other social scientists and to all of the other arts and scientists, is his career track that has, since obtaining the director position, emphasized program development and institutional service, and de-emphasized traditional teaching, and research.

Professor B (Social Sciences)

Background Information

Professor B is a professor of anthropology who has been employed by the study institution for fourteen years. She earned her Ph.D. in anthropology in 1980. Her first position at the institution was as assistant professor. Professor B was promoted to the rank of full professor in 1997. She has served as chair of the department of anthropology at the study institution. Professor B has been awarded teaching excellence awards at the institutional and state levels. Her work involves anthropological work in locations all over the world. Professor B’s research topics include anthropological perspectives in organizational culture, gender and equity at work, symbiotics and cultural analysis, and cultural dimensions of global change. Courses that she has taught include Introduction to Anthropology, Anthropology of Work, Information Technology and Global Culture, Ethnographic Methods, and Trans-Pacific Classroom.
Working Style

Professor B's working style includes both attributes of routine and flexibility. Some days during the week, or parts of days, are devoted to keeping a routine, including meeting routine deadlines. Other days of the week, usually the latter part of the week, she adopts a style that gives her greater flexibility to respond to changing priorities. Professor B attempts to use the early morning hours to have “a quiet moment, to reflect, and to organize her thoughts for the day.” Creative ideas often occur to her in the early morning hours. Professor B stated “aha ideas often occur in the morning after going to bed thinking about something.” During standard working hours, she devotes attention to activities such as teaching, including preparation, meeting with students, and tending to more routine tasks. Professor B’s most productive time for writing and editing tends to be in the evening hours. Reading is an additional work-related evening activity for Professor B.

Professor B enjoys attending to multiple tasks simultaneously. She stated “I enjoy juggling several things in the air instead of finishing one and then moving on to the next.” Professor B often has very unrelated issues going on simultaneously. She says sometimes this helps with creativity and sometimes it does not. Although Professor B noted that she is a fanatic about deadlines, especially for routine activities, she lets some projects float a little. Professor B does not always go from A to B, but often there is an “in between time” where she is not sure where the project is going. She emphasized projects are not all linear, but sometimes they are lateral as well. Sometimes major changes can occur, and it is not just a process of nurturing and growing, but rather a juggling process. There are times, she says, she has to scrap the first idea and start all
over. To assist professor B in developing some degree of order, she prioritizes in her mind. She utilizes "drawers" or "boxes" in her mind to help her remember. She attributes her career path, which involves work in different countries and languages, especially in Japanese and in English, as contributing to her need to compartmentalize information.

Professor B indicated that she always tries to push for 150 percent, and then is happy with 100 percent. She never goes for 100 percent and ends up with 80 percent. She suggested that she is very optimistic, and said, "I usually push for more than I can get." Concerning her strategy for overcoming obstacles she suggested that "if I can't go straight and a door doesn't open, go around, go below, go above, get some white knight somewhere far away, go outside. Get the legitimacy from somewhere else. If it doesn't work, go on. Always have a contingency plan." Professor B indicated that it is not the end of the world if a project does not get funded. She suggested that she tries to have three contingency plans, and that it is important to be flexible. Professor B suggested it is important to never fight a losing fight, and to always have an "escape hatch". She prefers to have a long-term orientation, recognizing the importance of "winning the war, not a battle."

Professor B provided several examples of her working style. Attributes such as a collaborative working style, persistence, and an active strategy were important to her when, as chair of the department, she was able to help accomplish a program expansion during a time of general institutional reorganization. Her strategy involved seeking collaboration for mutual benefit with various departments on campus, such as American
Professor B teaches a course that could be described as entrepreneurial or highly innovative. This course utilizes information technology, to link students at her home institution with students at a university in Japan. This anthropology course uses videoconferencing and electronic mail discussions to explore topics relating to cross-cultural understanding. Participation in the undergraduate course involves intensive dialogue with students from a different culture. Many of Professor B’s collaborative projects involve working with individuals from many different countries. A recent project involved editing a volume relating to cultural dimensions of global change in which she worked with anthropologists from seventeen countries. For some of her projects, Professor B indicated the value of working with graduate students. She suggested that they are often a source of fresh ideas.
In discussing how her work may have a dimension of entrepreneurial or creative working style, Professor B suggested that since her work involves applied anthropology, "all of what I do has something to do with creativity. The beauty of the job is that we identify our own issues to study, and then we are paid. What a wonderful job, very entrepreneurial in that sense. Unlike 9-5 jobs, nobody tells us the content of our courses. We can do a lot of creative things inside our teaching and, of course, research is our own baby. We create our own research." Professor B indicated that her department is "up and coming, morale is high, with good people in the department who get along well." She indicated that research is very important to her and invigorating, especially as she gets more into the international arena. She expressed a concern that it is difficult to travel during the academic year, but that she enjoys teaching also, "so you survive", she says. Professor B provided a useful listing of reasons why she may have been nominated as an individual reflecting behaviors that could be described as entrepreneurial. Her list included her high energy, high productivity, original and unique insight, multi-cultural experience, personal optimism, collaborative decision-making skills/human relations skills, enjoyment of her work, time management skills, can do attitude, persistence, and long-range planning and quality management skills. She believes self should not be important, but that the collective good should be emphasized. She suggested she does not have a big ego.

Organizational Conditions

Professor B expressed her opinion that money is very important to encouraging entrepreneurial activity. She asked, "without money how can you be entrepreneurial"? Obtaining resources is important for her work. Her curriculum vita references numerous
projects from a wide variety of sources in which she has obtained funding both from external sources and internal sources. The funding ranged from many grants under $5,000 to a couple larger grants over $100,000. Professor B noted that she “can always smell where the money is.” She indicated that she finds money, but that she understands that her institution may have a relatively small amount of professional development money compared to peer institutions. Professor B believed that obtaining money should not always be left to a struggle of individual faculty members. She thinks institutional decision-makers should be aware of the need for professional development funding. In addition to the importance of funding, Professor B references the invigorating nature of professional conferences, and stated that it is especially important for new faculty members to “go and do a lot of active things”, which she believes is in turn good for the institution. Giving professors seed money so something great can happen is valuable.

With respect to conditions that she believed are necessary to facilitating entrepreneurial work within her department, Professor B suggested several areas that are both present within her department and/or institution and areas that she believed could be improved upon. She indicated it is important for administration to make policy directives clear, and give enough room for faculty. She believed there needs to be a balance of centralization and decentralization. Professor B believed that as long as there is a transparency in procedure, people would go for it. She thinks fair procedures will be supported, and stated, “Doubts and anxiety result whenever procedures are opaque.” She stated that the role of a department chair concerning policy-making is to “make it clear, to provide for an open competition, to know procedures, to make sure minutes are out there, and to ensure that everybody knows what is being decided and that everyone has a say.”
If these conditions are present, most of the people take the consequences even if the
decision is unfavorable to their own position.

Issues that have been a problem within her department include space allocation,
access to high technology classrooms, and the general condition of her building. She
indicated that some conditions might be improving relating to general campus
infrastructure concerns, such as the information technology policy, and management of
information. She suggested that registration issues could be very time-consuming if
systems are not working properly. Since some of her work involves consortia or regional
or international organizations, Professor B often needs to finesse access to campus
facilities and offices on campus that support special programs, including summer
programs.

**Disciplinary Context**

Professor B indicated that the most valued categories of work within the field of
anthropology include books, refereed journals, and research grants. She indicated that
her work involved an inter-disciplinary approach. Her anthropological work draws from
international studies, Japanese studies, and Asian studies. Professor B’s vita references
numerous memberships, editorial positions, officer positions in associations, grants and
fellowships, and review boards. Her listing of publications in refereed publications
including journal articles, a book, and book chapters is extensive, as is her listing of
presentations before professional conferences. She is active in conducting field research,
and has served in a consulting capacity to many types of organizations. Her professional
record also includes a record of service to departmental and institutional governance, and
she has been active as an organizer of professional meetings, including a major international conference.

Professor C (Social Sciences)

Background Information

Professor C, an economics professor, has been employed by the study institution for thirty-three years. He teaches classes on the principles of economics and on the history of economic thought. His primary topics of research interest are in the areas of American economic thought, Chinese economic reforms, and the Panic of 1819. Recently, Professor C was honored with an institutional faculty award. He has been active in institutional governance and service. He previously served as dean of undergraduate studies and as assistant to the president. Professor C has performed numerous leadership roles within the local community including school board and city council membership.

Working Style

During a teaching semester, one of Professor C’s time-consuming activities is preparing for a lecture course that includes 250-300 students. He indicated the time and energy involved with preparing for such a larger lecture class is similar to preparing for a performance. For it to go well, he indicated, “you have to script it. You can’t go in and wing it.” Professor C noted, “If just ten percent of your students come by the office during a given week, that is like an entire normal size class stopping by.”
Professor C gives all essay-related tests. Therefore, grading examinations and other course assignments is a major time commitment. He typically works evenings, on activities such as review sessions, grading, reading, and working on his own research projects. Professor C indicated that he is most productive during the morning hours, and believes he may be most creative when he is working in groups "tossing ideas around."

A project Professor C emphasized as representing a creative, innovative, or entrepreneurial approach to his work is a project that involved adding a service learning component to his economics course. The service learning component of the course includes hands on student learning relating to economic and community development-related issues through student projects with community agency clients. Professor C suggested that his work in this area grew out of a desire to do some things that he had considered doing with a large lecture class that involved a different approach to teaching introductory economics, and provided an opportunity to add a service learning experience relating to economics for students. He suggested that the experience for students has been valuable, both in developing projects and in obtaining experience working in a group. For professor C, the program represents an example of having ideas floating around, bantering ideas around, and meeting multiple curricular goals.

Professor C indicated one of his most important projects involved work he performed as dean of undergraduate studies. This project involved a rigorous curricular review process that ultimately involved about one-third of the faculty. Professor C directed a steering committee that oversaw the process, including the work of numerous issue committees. The result of that process was a completely restructured undergraduate
curriculum with a different philosophy. He noted this process was especially complex since the “institutional culture is a strange hybrid.” In many ways, he stated, it is “almost a research university”, but it also “wants to maintain atmosphere and human scale”, which is difficult.

Professor C viewed teaching as an entrepreneurial activity. Teaching he said, “involves selling ideas to students, trying to get them excited about new ways of thinking, new ways of approaching the world, and that very process is entrepreneurial.” Professor C viewed research “like an initial public offering (IPO) for a business” indicating that funding agencies have to be convinced your idea is good and to provide financial support for it. Professor C noted that as a professor to some degree you can do what you want, but for many types of projects, support is needed, “whether it is internal, whether you are selling to research committees or department chairs or foundations or whatever, you are doing an IPO.”

In thinking about his utilization of time, Professor C suggested that in anything you do, there is an allocation question. He stated, “You can’t do more here without less there, unless there is some slack, without making some changes.” He indicated that his time utilization may ebb and flow. For example, developing a new course takes considerable time whereas restructuring a course after coming back from administrative responsibilities may require some “tweaking” but not as much time.

Two areas that represent an entrepreneurial working style of Professor C include the time he spends outside of the economics department serving as an assistant to the
president, and his role as a member of city council. The role in the president’s office reflects a form of institutional service, and was valuable in helping him think about the institution as a whole, rather than just from the perspective of his department or the arts and sciences division. The experience made him aware of tradeoffs that are necessary, and helped him step back and keep the big picture in mind. His role as city council member has been valuable in helping him think through the community service project component of his economics course. He frequently uses his knowledge of the community as a member of city council, and from other community service roles, as examples in his classes.

*Organizational Conditions*

Professor C, in discussing work-related obstacles, suggested it is important to recognize that there are different types of obstacles, and often obstacles relate in some way to dealing with people. He says, “Many obstacles come from people. It is important to make people a part of the process, making sure they are informed, that they have had their chance to have their say. And then if a decision does not go their way, they can usually deal with it better.”

In obtaining resources to advance his work, Professor C maintains that “often one pot of funding is not sufficient. It is important to cobble things together.” One example he cited was a Fulbright award for research in Hong Kong. With that project he developed contacts here and in Hong Kong, and several activities resulted including a May session course, a collaborative project, and a student and faculty trip to Hong Kong. He utilized resources from multiple sources, including the Fulbright award, an
international study center, and an American studies center. Professor C maintained that
to be innovative, usually one pot is not enough. He stated “It is important to make clear
that the goals of a proposed project are the same as the goals of whomever you are going
to for funding.”

Conditions that facilitate Professor C’s work include an environment that
encourages innovative thinking. He believes that it is important for a department chair,
dean, or provost to be open to experimentation. The expertise rests with the individual
faculty member, and he says that a dean can get “a big bang on bucks when faculty want
to spend time on something.” He believes it is valuable to have enough flexibility to
have the time, and other resources to pursue innovative projects. Professor C indicated
that he did not advocate “overuse of adjunct faculty, but that strategically used adjuncts
can be useful.”

**Disciplinary Context**

Professor C noted that his departmental culture values highly refereed journal
articles. He indicated that refereed journal articles are “about the only thing that counts
in this department.” Concerning the discipline of economics, while refereed journals are
the most valued work products, collected volumes, and books are also valued. In some
sub-disciplines, books are more highly valued than in other sub-disciplines. Professor C
suggested that the work products of economics professors within his department and
within the field of economics are fairly traditional academic products, and thus fairly
conservative. He indicated, however, that the field itself, “which deals with issues
relating to constrained optimism, implies an understanding that if you expand resources
available, things can happen that would not otherwise happen. It encourages everybody to be entrepreneurial."

Professor C suggested that when thinking about academic careers, "there may be two extremes; the person who has one thing in mind for a career and the other extreme, going from project to project along a wide range of topics, including inter-disciplinary. The latter probably describes me."

Professor D (Social Sciences)

Background Information

Professor D is also a professor of economics. He joined the institution twenty-nine years ago as an assistant professor, prior to completing his Ph.D. He was promoted to the rank of full professor in 1994. His research interests include labor and human resource economics, higher education policy, and science and technology policy. Some of the courses he has taught include Policy Research Seminar, Benefit-Cost Analysis, Labor Market Analysis, and Human Resource Policy Analysis. An important role performed by Professor D, over the last thirteen years, is his development of the study institution's public policy program, and the public policy research center that is part of the program. His work has involved traditional academic publications such as refereed journals, conference presentations, teaching, and service. An additional category of work for Professor D includes policy studies for different types of client organizations, including federal and state government agencies, nonprofit organizations, educational institutions, and private sector firms. He also facilitates student involvement in policy studies for client organizations.
Working Style

Professor D described the successes and the obstacles involved in building the public policy program, and in directing the public policy research center. Professor D indicated that as the center matured, it became relatively easy to obtain resources to perform projects, but increasingly more difficult to get faculty to want to perform the projects. Review of the study institution's grant data indicates Professor D has had success in obtaining grant funding for projects. As a result of growth of center popularity, Professor D often assumed responsibilities for projects in which he did not have a substantial degree of expertise when he was not able to identify someone to assume leadership for a client project. While this provided many opportunities for Professor D to have an impact on public policy, some time-consuming projects would inevitably take him away from his own research areas. At times during the development of the center and program, Professor D de-emphasized his own research agenda, since emphasizing his own research interests would represent time not spent serving clients or following up on leads for new projects for students or faculty.

Professor D has expressed entrepreneur-related attributes in his roles as program and center director. To keep a steady flow of projects to the center for faculty and students, Professor D has had to hustle for grants and client projects. Although organizational representatives frequently come to him with ideas for projects, he has been proactive in promoting center capabilities and his desire to identify projects for students. A wide variety of federal and state agencies are represented in his partial listing of center clients. Whenever he meets with someone concerning a project, Professor D lets them know what the center does, and asks them to let him know if they have any projects.
Some clients have been regular on-going clients. Other clients may become dormant for a while, and then later become active again.

Professor D discussed the choice he made to emphasize center and program development activities over his own research. "I have done some, but not near as much research as I would have if I weren't hustling grants and contracts and selling the program. Clearly my c.v. is less impressive on the research side than it could be because the path in 1987 of getting grants that led to publications changed to generating grants that did not lead to publications." He suggested that generating reports, but not journal articles, may have delayed his promotion to full professor. Professor D stated, "While I was bringing in lots of money, doing wondrous things developing the program that people appreciated at some level, it wasn't so appreciated at the level of promoting me to full professor, and I understood that. It was a semi-conscious decision for me to pursue program development and center development." Professor D indicated that some projects have been turned into publications, and that he could have pursued publication for many of the other projects. He suggested, however, that taking a project to the next level through publication would have meant less available energy to pursue grants or the next project.

An additional aspect of his work that Professor D suggested was potentially entrepreneurial, has been his extensive involvement in fund raising for the public policy program and research center beyond grants and contracts for policy studies. He noted that over the years fundraising has taken a big chunk of his time in working with program
board members to raise financial support for the program and center. He has solicited funding from individuals and corporate foundations for both major and minor gifts.

Professor D indicated that he believes two labels describe him well, a problem solver and an entrepreneur. With respect to solving problems, he attempts to solve them quickly, but not in haste or anger or overreaction. To make sure he has thought through his decisions, he tries to utilize a “48-hour rule.” He does not make important decisions without considering the issue for approximately 48 hours. He believes when working with people, keeping a level head is important. He suggested that there are a lot of “hot-headed people in the world”, and in dealing with faculty colleagues, clients, and family, sometimes people will get mad and then later will have gotten over the issue. So he is careful not to overreact or solve problems that are not really there. Professor D prefers to see if a potential problem is still there tomorrow. He described the thinking process he typically uses when solving problems. He asks, “What is the problem, and how can I solve it”? He sleeps on the problem, comes up with options, weighs the options, and solves it. Professor D said, “I do that here, around the center, I also do it in my life and in my family.” Professor D maintained that he is patient and listens to others’ opinions, but that he has a point of view. He stated, “Some people have accused me of not being a leader, but to listening to which ways the winds are blowing. I think actually the way I lead is by setting the agenda, seeing how it goes, listening to wise people, giving them their day in court, then moving things forward in a way that seems like a consensus. That does not mean that I trick people, but I am just trying to make people feel like they are part of the process.” Professor D suggested that collaboration, cooperation, and
promoting ideas of the group and not one's own ideas, is the "only way to succeed/survive in academia."

Concerning his working style, Professor D noted that he often takes on more work than he perhaps should. A large workload forces him to pay close attention to deadlines, which serve as a motivator. He may prefer a style that includes time for reflection and flexibility, but indicated that the reality of the work world is that deadlines are important. The importance of meeting deadlines is something he tries to impress upon his students since deadlines are a fact of life in the world of policy. Professor D suggested that he is very productive late at night. That is when his creative juices are often flowing. Unfortunately, late nights, he suggested also conflict with the business culture that requires him to be ready for the next day.

Organizational Conditions

Professor D suggested that there are several ingredients that he needs from administrators in order to work effectively; "big budgets, trust in his judgment, and a dialogue with administration." In developing his program, he indicated that early on he had support from the top. Professor D stated, "It was important to have a dialogue with them to bounce off ideas so I didn’t go down one path that would not be supported... the administration trusted me or grew to trust me and then I was able to move forward unencumbered." After a lag, Professor D was able to secure released time or support, and said he was "fairly unencumbered by bureaucracy. The stuff I was pitching, the administration was buying." He suggested that it was always easier to move forward at the top than at the faculty level. The faculty was a much tougher audience than the
administration. He suggested that is not always the case, and stated "Sometimes faculty have ideas, and then try to sell to administration and they balk, but for the public policy program, I selected programs that I thought were responding to signals central administration was sending. I helped package programs in a way that I thought made sense for administration."

At one time adequate space for the public policy program and research center was an issue for Professor D. He had to capture space for students, the research center, computer labs, and administrative offices. The size of the program budget was suggested as an additional issue that could be categorized as an inhibiting working condition. In that regard, Professor D indicated that "clearly our aspirations have been higher than our budget permitted." He suggested that difficulty in sustaining faculty interest in providing services to center clients was at least in part due to the loose affiliation faculty had with the center or program, and to the fact that reward structures were tied to their home departments, and not to the public policy program/research center. Reward structures of professors' own departments did not necessarily reward them for conducting center-related projects. An exception to a lack of impact concerning reward incentives may exist if a project led to a publication in a refereed publication that was valued by the department. Professor D suggested, in general, professors can get projects on their own and earn higher consulting fees. When working on projects outside of the center, they can charge their own rate and do not have to charge a rate consistent with their faculty salary. If consulting as an individual, they can charge 50 to 100 percent more. Therefore, the incentives to work on projects through the university are very small, and as a result, "it is difficult to sustain a faculty driven model." Concerning involving faculty
in projects, Professor D noted that money typically is going to be available for something new and challenging. He indicated that “what is new and challenging may be something different than what the faculty are pursuing. Faculty logically pursue a track that makes sense in terms of their academic discipline. It is only rare and lucky if the new and creative idea fits nicely with what the faculty does.”

Professor D suggested that other centers in the state have larger staffs and those centers can produce a lot of studies. A larger staff would enable his center to bring in faculty who lend their expertise on a short-term basis, creating a win-win situation. The university would get the project, including public service involvement, and faculty would bring in academic strengths without investing significant time. Recently, Professor D put a moratorium on taking on outside contracts, indicating that without additional staff it would be difficult to sustain his past level of commitment to center projects.

**Disciplinary Context**

Professor D indicated that the route he took in developing the center has not been terribly self-serving. By branching out beyond his core areas of interest, Professor D has exposed himself to some level of criticism from faculty. Some criticized him for not being discriminating enough because there was a broad spectrum of projects that he would accept. Others have criticized him for overextending on projects where the center lacked the expertise. In working in some areas, he suggested that he did it as an entrepreneur for the university. Professor D indicated that his c.v. could be read generously, but there are some areas he has greater depth than in others. “Some projects, he stated, “if you look at it from a career interest perspective, were silly for me to take.”
He noted that there are some areas that he has not published, although he has done studies. Concerning faculty involvement, in the end the faculty did not see the benefits of engaging in projects. Professor D indicated that they would "latch onto projects, and this burned them out." They did not want to come back for more because they realized opportunity costs. Currently, Professor D indicated he is involved in another entrepreneurial project that may be outside of his area of expertise, but it represents a project that "gets his entrepreneurial and creative juices flowing." So again, he is trying to figure out ways to get faculty involved.

Professor D indicated that the center might have been less successful than it could have been due to difficulties of getting faculty to participate. He suggested that some public policy schools may be more accepting of reports as final products. The departmental environment is not very accepting of reports as final outcomes for reward purposes. Professor D indicated he is not sure he would "push it very far" in trying to change how reports are considered within the department. He discussed the tradeoffs he has made in working on reports for clients. He believes the time he has spent on reports have had a tremendous impact. Professor D thinks he may be less well known among academics in his field, but more well known by government agencies. He suggested that overall he thinks he hit a happy balance, and may be moving more toward the academic side again in terms of his own career stage. He indicated that, in general, the field of economics may encourage entrepreneurial behaviors in areas such as getting grants and consulting. Suggesting an even greater emphasis upon entrepreneurial behavior in a public policy context, Professor D indicated "public policy is very much an
entrepreneurial activity in the sense of having a link with the policy arena. To do that, he believes you have to be entrepreneurial. You “have to link up.”

Professor E (Social Sciences)

Background Information

Professor E is a professor of government who has been employed by the study institution for thirty-four years. In addition to a Ph.D., Professor E holds a law degree. He began at the study institution as an assistant professor in 1968 and was promoted to full professor in 1977. Among the courses he teaches is an introductory course on American government and politics. His primary research interests include topics relating to aspects of democracy in Latin America, with a special interest in Mexico. He has an interest in how political systems translate authority to democracy. His c.v. includes an extensive listing of publications, conference presentations, and special research projects. Professor E, until recently, served as a member of the state legislature, a role that was complementary to his teaching and research interests.

Working Style

Professor E suggested that efficient management of his time is important to him. His concern for his use of time is manifested in a style that often encourages people who are relating to him to get to the point quickly. There are many categories of people with whom he relates, such as disciplinary peers at other academic institutions, think tank professionals, representatives of foreign policy organizations, students, departmental and institutional colleagues, government officials and other clients, lawmakers and constituents. Due to the demands on his time and his desire for professional productivity,
he makes careful decisions about where to spend his energy. He referenced examples from his legislative career in which he would frequently ask constituents to tell him precisely what their problem was and what they would like for him to do to assist them. Professor E suggested that his working style may have been heavily influenced by living circumstances as a young person that taught him to appreciate the value of time. He noted how in college he did not want to waste time because he “was not sure if he would flunk out or not”, and it was important to him to make sure he was successful.

Professor E suggested he needs large blocks of uninterrupted time for projects that involve writing. He routinely spends a substantial part of the weekend in his office. Weekend time in the office enables him to be productive since the telephone is not ringing and there are no “students at his door.” Although large blocks of writing time are critical to his productivity, he also attempts to write something every day even if it is just a few paragraphs. Concerning his productivity, Professor E indicated he requires little sleep, thus giving him more time to accomplish his work. He uses simple checklists to help keep himself organized. Professor E will sometimes collaborate with other professors, especially to help a junior colleague, but in general, collaboration is not as productive for him. He likes to meet deadlines, and will often give a small honorarium to individuals commenting on or reading his papers.

Organizational Conditions

Professor E indicated he needs very little from academic administration. He believes his work environment provides him with some of the items that he needs in to be productive. Help in configuring his course schedule so he can teach on Tuesdays and
Thursdays, and an extra stipend for research activities were noted as important for his productivity. He also suggested that a nice office with equipment and needed supplies as well as good clerical and other support staff, were helpful to him in accomplishing his work.

Speaking generally about conditions that he needs to be successful, Professor E suggested that he had a great department chair, and minimal interaction from administration. He suggested that he would be inhibited in his work if he had to attend a lot of boring meetings, or if administration was looking over his shoulder. He indicated that he believes faculty meetings are a colossal waste of time, but that he does attend departmental meetings. Professor E cited taking job candidates to dinner as one example of how he likes to participate in departmental governance. Overall, Professor E indicated that he does not believe he encounters criticism for his working style, although he suggested that the president or provost may have on occasion received criticism about him due to his legislative role.

Disciplinary Context

Books, journal articles, and monographs represent the most valued categories of work products within Professor E’s discipline. Professor E believes he may rank within the top ten percent of the most productive professors within his area of expertise. His disciplinary-related activities include publishing journal articles, books and monographs. He also edits disciplinary publications, writes articles for encyclopedias and yearbooks, gives invited talks and guest lectures, participates in conferences, and is active in foreign policy organizations. Professor E is in demand as a speaker, and earns an honorarium for
many speaking engagements. He has also provided consulting-related services or lectures for many organizations. Representative organizations include the U.S. Department of State, Foreign Service Institute, National Defense University, the Defense Intelligence Institute, and U.S. Army War College. Professor E obtains a substantial amount of media coverage for his work. His c.v. notes that more than 400 articles in newspapers have referenced his work, and his c.v. listed appearances on many national news-related television programs.

Professor F (Social Sciences)

*Background Information*

“Professor F” is director of a highly productive center for archaeological research that is affiliated with the study institution. He has worked for the center for thirteen years, serving as either co-director or director. Professor F has served as director since 1997. He has served as the principal investigator or co-principal investigator for over 500 grants and contracts awarded by federal and state agencies, foundations, and individuals. Professor F’s c.v. indicated in a ten-year period up to 1999, the Center obtained grants totaling approximately $8.5 million. Professor F is unique to the study in that he is not tenured or a tenure-track professor. He is also the only study participant who has not completed a terminal degree. He is currently a Ph.D. candidate. Although he is not technically part of the instructional faculty, his role includes many functions that are similar to the faculty role, and his candor concerning some of the advantages and disadvantages of university affiliation for the center was instructive in thinking about the conditions within academic centers and departments that may promote or inhibit entrepreneurial work.
Working Style

The primary activity of the center is conducting archaeological studies, on a contract basis, for a wide variety of clients. Many of the studies are for sites that are of national historical significance and are sponsored by organizations interested in preserving our national heritage. Another category of studies involve investigations on behalf of state agencies or private firms to determine if artifacts or other objects of significance are within the path of proposed development projects, such as a highway or building. His work, and that of center staff, have received media attention, with work being featured in a variety of print and electronic media.

The size of the center staff fluctuates. Depending on project flow, the staff may include 12-15 full-time staff, but can be 30-40 people when hourly workers are included. As center director, Professor F coordinates the activity of his staff, manages the center budget, prepares long range plans, makes project assignments, supervises preparation of study reports, and negotiates contracts for new projects. Since the center receives minimal institutional support other than office space, water, and electricity, the center is dependent upon grants and contracts in order to maintain a full-time professional staff, and conduct research studies.

Professor F suggested that he valued hard work and typically works hard from approximately 7 a.m. until approximately 4 p.m. each workday. He referenced the first hour of the workday as being important to him in setting the stage for what he is able to accomplish the rest of the day. He tries to work hard all day and not take work home, but that is not always possible given that he is frequently pre-occupied with work-related
responsibilities. He is very aware of his responsibility to maintain a constant flow of project work, and thus, he devotes substantial time and energy to seeking projects for the center, including preparation of proposals.

Professor F indicated that in addition to working hard, he tries to work in an efficient and organized manner. He stated that he “can’t mess around, and is not very patient with chit-chat or extraneous stuff.” He does not always have the latest technology because he is not always satisfied that it translates into efficiency. Therefore, he lets other people try new things. A lot of his equipment purchases have to be a no risk or low risk venture. Professor F indicated that he cannot work without having a plan. As such, he tries to clearly communicate the plan and its goals to everybody. He finds that flexibility and an ability to make adjustments is essential in order to respond to clients as their priorities change. Managing growth of the center is important to Professor F. The center has been encouraged to grow by the university and by clients. He maintained, however, growth is hard to sustain, and that it is disruptive to “gear up and gear down”, and accordingly, he seeks to maintain stability. Professor F suggested that the center operates in a competitive business environment. Projects his center are awarded are not sole-sourced so there are people competing for the jobs. According to Professor F, the center has to distinguish itself, “not always in the research design per se, but on issues such as allocation of personnel, ratios of administrative to field and lab personnel, and creative budgeting.”
Organizational Conditions

Professor F indicated that service to clients is the center's core responsibility and although he would like to have greater involvement in teaching and advising students, at present, he has limited his involvement in that area, in part, due to the need to devote his time to keeping resources flowing to the center. He suggested that teaching was not supported by the university through an operating support, and as such he cannot afford to be involved in that activity. He suggested that at other times he has developed and taught courses, supervised student interns, and advised students on theses. He indicated that students frequently ask him if they can affiliate with the center or if he will advise them on their thesis. Although Professor F wants to teach because it is a natural link to the institution, the university does not fund the center as it does other educational units. He does not teach because he believes his clients should not have to pay for it. This issue concerns Professor F because without the teaching component, the center should be a business.

Professor F described some of the tension that he feels regarding autonomy of the center versus developing a closer affiliation with the main campus of the university. He suggested that his center is valued by the department of anthropology and by senior administrators primarily for the revenue it brings to the institution through indirect costs from some of the center clients. The center also brings prestige to the university through the substantial press it generates for some of its projects, some of which are regarded as being important documentations of historical artifacts.
Professor F suggested that at least one individual within central administration has been very supportive of his operation, but that by and large the center is left alone. He suggested that his center would like to “contribute to education”. He feels they have “run a well managed, tight ship.” He indicated that they organize a master plan every year, with short and long term goals, and prepare an annual report with numbers of projects, people, amounts of money and locational attributes. In addition they discuss revenue and have a review board. In each of these things, he says the center has a vision, which Professor F believes is important. The problem, he says is “the vision is not shared by everyone else, and the road block is money.” He indicated that the center has not met all of its goals, and the problem is that it cannot. The plan, he says, calls for compensation, support, the need for an operating budget and some salary support. He says the center needs all of the indirect costs that are due the unit. Professor F says, “if we had that we could rock and roll.”

Professor F believes that if he had more operating support he could put together a “model program at the national level, maybe even the international level.” He wonders why others do not share that vision. Professor F suggested that it would be valuable if departmental and other administrators worked with him to develop a plan that spells out the linkages, the goals, and what is needed to do to reach the goals, and then put it into effect. He suggested that progress may be made with discussions that were forthcoming with decision-makers.

With respect to forging closer ties to the university, Professor F described the tension between the autonomy that the center currently enjoys and the accountability that
would likely come with increased support. Regarding this issue, he stated, "the old saying you have to be careful what you wish for I know it is true. Here I am explaining what it would take to get to a new plateau, which means expanding our educational and research roles, but there is a price. We'll be monitored more closely. We would be constrained more because suddenly there is a real investment." Professor F believes people will manage which will cause the center to lose some of the autonomy. He understands this and indicated the center is prepared to suffer that if it had to because he thinks the outcome would be positive. He stated, "There is no question the key to our success is we have been plain old left alone; nobody comes over here; nobody asks any questions. They don't worry and at the end of the fiscal year if our revenue is steady or up; everything is hunky dory."

**Disciplinary Context**

Professor F described archaeology as an applied branch of anthropology. Both in relation to the anthropology department at his home institution and within the field of anthropology he suggested that peer-reviewed journal articles were the most valued category of work products. Although, Professor F's vita includes numerous references to journal publications, he indicated that writing scholarly articles is something he does opportunistically or on a "catch as catch can" basis because he wants to and not because his position requires that he do so. These articles are written on his own time and are not a requirement.

Archaeology as an applied field highly values applied projects with work products that often include reports and studies of archaeological findings. Professor F suggested
that at times he had "tense discussions with people here because we are like second class citizens, operating in an applied arena. I don't appreciate being relegated to second class status. Part of the tension that exists between archaeology and anthropology is to the point that they don't even believe it is appropriate for us to instruct students. It is a lively debate...a huge debate." He suggested that what is "under appreciated is the fact that his center can do both; peer reviewed articles and reports of studies for clients." In illustrating the importance of applied projects in the field of archaeology, he suggested that attendees at an annual conference of an important organization of archaeologists are often concerned not with issues "concerning anthropological theory, but rather, with issues such as OSHA requirements, business management practices, better proposal writing, marketing and so forth." Professor F indicated that the applied component of archaeology has grown and he has been involved in disciplinary activities pertaining to issues of importance to practitioners and educators via service on committees and in publications.

Professor G (Social Sciences)

Background Information

Professor G is an associate professor of economics. He began his employment at the study institution as an assistant professor nine years ago. He teaches courses in the areas of labor economics, econometrics, and a research course for thesis students. Some of his research interests include topics such as labor economics, race in labor markets, economics of education, and wage inequalities. Professor G recently established a center to facilitate the study of issues relating to equality. He has been active within the local community including serving on the school board and in performing leadership roles on
projects at the study institution. Recently, he served as chief labor economist for the U.S. Department of Labor.

Working Style

Professor G described his working style as reflecting an awareness of engagement in projects within different spheres of influence that are like expanding and intersecting circles. Concerning entrepreneurial work in academia, he suggested there is “entrepreneurship in terms of the broader influence outside of your department, to the university. There is entrepreneurship in terms of your local community, state, and national and international. He noted when he first came to the institution his goal was to establish himself within the department, which is one circle. He advises junior colleagues to identify one or two areas or activities in the department that they can try to label as being their contribution. Then, the next few years that circle gets bigger to the college community and it is important to identify something there. Then depending on preferences and background, some people are satisfied with those two dimensions. Professor G believes in expanding his work into those bigger circles.” He suggested that he has reached a point in his career where “the circles per se are not getting bigger, but now the circles intersect with one another.”

Professor G’s temporary assignment as chief economist with the U.S. Department of Labor was an important assignment for him. The experience enabled him to be involved in a wide variety of labor issues, and provided a valuable experience handling himself in an environment with a rapid fire pace and long stretches of high intensity. He is seeking ways to “pivot off of that experience.” Professor G described some of his
recent projects. One free-lance project involves developing a media-oriented set of
materials for young people that promotes economic literacy. With this pilot project,
video tapes would be distributed to schools and labor unions and targeted toward
increasing economic literacy, including how labor markets work, and policy debates
surrounding labor issues. A project examining the impact that raising the minimum wage
would have in improving food security represents another recent project.

Professor G likes to free associate, and will also problem solve and think about
issues and strategies while running. He indicated that in addition to working in his office
during standard business hours, usually he will have a “what you might call an eleven
o’clock to one o’clock session after everyone goes to bed.” That time is spent typically
reading, editing, or preparing for the next day. During the summer months, Professor G
will typically have four or five students working for him.

Organizational Conditions

Professor G expressed an appreciation for the flexibility that he has in his
academic position, especially in the summer months. His department tries to cover all
areas of economics, and thus, there is little overlapping interest or training among faculty
members. Therefore, it is difficult to get a lot of critical feedback on his work. Professor
G indicated the way he solved this was by spending a lot of time in Washington DC. He
indicated that he has the biggest phone bill in the department. He spends a lot of time in
DC carving out relationships with people in the National Urban League, the AFL-CIO,
and the Department of Labor. Those affiliations enable him to get good critical feedback
on his research. Professor G also indicated that his spouse, also an economics professor,
has had an influence on his entrepreneurial working style, and provides helpful advice and support, including providing critical feedback on his manuscripts. Professor G suggested representatives at his university, including the dean, president and provost, have all been “very responsive and proactive in terms of trying to address my needs and the directions I want to go.”

Disciplinary Context

Professor G indicated that his work has been enhanced by feeling like he is “self-employed so that I can control my own research and write on what I want to write on and research on what I want because I know that I have colleagues in other places that frown on doing certain kinds of research, but that has not been the case here within the department.” He expressed appreciation that one of the responses to the growing demands upon his time “as the circles have gotten bigger”, has been to less on teaching. Internal support and grants from the National Science Foundation have been used to buy down some time. With respect to his working style, Professor G suggested that he has tried to be “approachable, keep my door open, and also pretty much make sure that any writing that I do if it is not in a refereed journal, make sure it is in a high quality publication.” He indicated that if he has encountered any criticism it may be for “not being a pure academic and focusing only on refereed publications.” He believed that focusing only on refereed journals could be shortsighted from the standpoint of maximizing the university's name. Professor G also indicated that he does not do economics “for gymnastics or having it sit on some shelf.” He has had “many mentors and compatriots that have engrained in him the importance of having to have personal enjoyment by doing economics with a purpose.” He stated that economics has so many
applications and is applied in so many settings. With respect to what professors in economics departments value, he suggested that at some place like the University of Chicago, the focus is on publishing and research. He said that at Harvard, where he did his graduate work, there were people who “always kept their publishing flank up, but who would use the circle metaphor and look at economics in a broader context.” Professor G prefers to work with people who have this broader notion of how to practice economics.

Professor H (Social Sciences)

Background Information

Professor H is an academic administrator and director of a center. He is also affiliated with the study institution’s law school and government department. Professor H began his position in 1999. He holds a Ph.D. and law degree. He has extensive experience in international relations, serving in various capacities, including as a consultant for federal government agencies and foreign policy organizations. Professor H’s professional background also includes experience starting and managing a multinational organization, and employment with a national law firm. He has written more than sixty publications on topics such as global issues, trade, international security, and arms control issues.

Working Style

Professor H collaborates with central administrators, department chairs, and deans. He works closely with individual faculty members from many different departments, center staff, students, and experts from fields such as law, foreign policy,
and international relations, among others. He noted he enjoyed collaborative work and solitary work. His work involves a variety of work products including conferences, seminars, forums, and grant proposals as well as responsibilities associated with program development, managing existing programs, fund raising, and his role as an academic administrator. He manages a staff that included approximately eight members and nine student workers. He maintains that he listens to his staff, and believes in providing discretionary spending authority or seed capital for projects.

Professor H suggested his management philosophy includes hiring the best people you can afford, providing them with the resources necessary to perform their roles, and giving them substantial autonomy and freedom to accomplish projects. He believed you have to provide the tools people need to be successful. He keeps an open door and expressed a willingness to assist when needed. Professor H suggested he values results over routines. Providing constant verbal feedback and encouragement is an important aspect of his working style.

Professor H needs large blocks of time for writing projects, and stated he often prefers working late at night because of fewer distractions. Professor H's law firm experience helped him learn time management skills. He considers himself good at multi-tasking and able to delegate responsibility. Obtaining resources so that the center can present its programs is an important role for Professor H. He works with his board of directors to identify sources of funding, and seeks funding from individuals, foundations, and government agencies. A major grant in which Professor H was involved was announced during the study period. Professor H has substantial experience responding to
media inquiries, and presenting before public organizations, including testimony before government organizations. He actively promoted the work of the center by actively seeking media coverage for center activities.

Organizational Conditions

Professor H considers his center as having an expectation to engage in entrepreneurial behaviors. He encourages entrepreneurial thinking in staff, students, and faculty who affiliate with the center. The center sponsors internal grant programs that provided funding to faculty for their engagement in entrepreneurial projects. He indicated that it is important to reward your best faculty, and maintained that released time can be important. An important function of the study center he managed and his academic program was encouraging research and other involvement of faculty and students representing multiple disciplines to affiliate with the center for special projects. Professor expressed his opinion that his study can be great within his disciplinary area, and that he had worked with academic administrators and professors to implement planning for his area. He expressed a desire for additional resources for projects and noted that his center was understaffed and needed additional working space.

Disciplinary Context

Areas of expertise for Professor H include national security law, arms control, international security and topics relating to Korea. The program includes academic majors and minors in topics associated with international studies. It provides opportunities for students to study cultures and languages of the world, as well as historic, political, and economic issues. The program has a significant outreach to
students and professors on campus. The center sponsored numerous programs that
promoted involvement of students and faculty from areas outside of international studies.
It regularly sponsors forums addressing topics of international concern and featured
distinguished speakers from the fields of international affairs and culture. Center
activities involve collaboration with individuals representing many organizational
contexts.

Professor H indicated that books, journals, and sponsored research represent
categories of most valued products of his disciplinary field. His work is inter-
disciplinary, combining regional affairs with arms control knowledge. Heavy influences
upon his field were federal government agencies, and foreign policy organizations.
Professor H did not follow what would appear to be a typical academic track to his
academic administration role. He has not risen through the academic ranks at a
university prior to obtaining his academic administration position. Rather, he developed
expertise through service with foreign policy organizations, government agencies, and an
international business organization.

Professor I (Arts and Humanities)

Background Information

Professor I is an associate professor of music. She has been employed by the
study institution for nine years. Professor I teaches a variety of music courses, especially
courses relating to music from a non-western perspective. She is an ethnomusicologist;
the only one within the music department. As an ethnomusicologist, she is interested in
topics associated with the influence of music in the daily lives of people from many
different cultures. Professor I has devoted substantial energy to understanding traditions of music of eastern religions and the Middle East. In addition to her responsibilities relating to teaching, research, and traditional service to her discipline and institution, Professor I has substantial performance-related responsibilities. Professor I directs an active Eastern music ensemble that involves frequent individual lessons, group rehearsals, marketing of performances, maintenance of instruments, and performance. Professor I’s research on studying the role of music in cultures has taken her to different locations in the United States and to many countries.

**Working Style**

Professor I referenced how the multiple demands of coordinating activities relating to her performance role contain elements that can be easily compared to the multiple demands of the work of entrepreneurs from a business context. A project that she described as reflecting her entrepreneurial working style was that of compiling a compact disk (CD) of selected performances of her Middle Eastern ensemble. Like an entrepreneurial business activity, production of the CD involved budgeting, marketing and sales-related activities.

Professor I described the many demands upon her time. She suggested that “she gets wrapped up in teaching and the social aspects of teaching.” She comes to her office on most days. Since she is the only ethnomusicologist within the music department, her courses are in great demand, and are typically full. One of her classes is a large lecture class with approximately sixty students. In addition, she teaches a smaller seminar class. The performance aspect of her work, coordinating the Eastern music ensemble and the
private and group rehearsals that go with that responsibility, take up a significant amount of time, affecting time that is available for other activities such as pursuing her scholarly interests. Since she is the only professor in the music department whose specialty is non-western, she indicated that she has “kind of a missionary zeal” to encourage her students as much as possible.

In thinking about her entrepreneurial working style, Professor I indicated when she has an idea for a new project, such as adding a musical performance, she will “expend the extra effort to organize the project, make the extra phone calls or emails to get the ball rolling”, whereas some others may be less motivated to go the extra mile to initiate projects. Professor I suggested that “just like some people need 5 hours sleep and some need 11, you can tell the other people you need to do more, more committees, take more initiative, and they just do not do it. It is just not there. There are other people where they see something say hey we could make this happen, it will take a few phone calls, a few emails, then it means making a flyer, make a program, you need to be on campus three extra nights per week, which means you need to get a babysitter. Every little project has a whole family of projects.” She noted “some people see an opportunity, and it just does not even occur to them that it would be interesting to make it happen.” Each new performance-related activity involves scheduling or securing a venue, distributing flyers, setting up and conducting rehearsals, selecting music and developing written programs, and making logistical arrangements to move instruments to and from the performance venue. While she often will have student assistants help with performance-related details, much of the work still rests with her to make sure it gets done.
Professor I tries to protect some of her time so that she can engage in focused writing relating to research projects. Often she will start working at home at around 5:00 a.m. to get some of her work done in an undistracted environment. The early morning hours are often her best hours for writing, grading, and reading. Some days she will come to the office, intent on closing her office door to write. Invariably, she says something will come up that needs her attention. When Professor I gets distracted, she typically finds somewhere to hide away to work on projects. She indicated that much of her creative performance-related work, including rehearsals, takes place later in the day and on weekends.

Organizational Conditions

Another demand upon Professor I’s time and energy is a desire on her part to be supportive of music department performances sponsored by other faculty members. Support of other colleagues and their students requires additional weekday evening commitments. She is a performer and wants colleagues to be interested in her performances and guest artists she invites. If her colleagues support her concerts, she wants to reciprocate. Because of her many commitments, Professor I suggested that scholarship-related activities often receive less attention than she would like. She works on scholarly works when she has a deadline, or during school breaks and leaves. Professor I indicated that she like many professors, tries to “carve out chunks” of time for scholarship, but that it is challenging to avoid taking any phone calls, concerts, and e-mails, to concentrate on her work. She noted that her inability to isolate herself more may be one of her faults.
To Professor I, a wonderful aspect of academia is the open-mindedness and level of independence. She says people trust you to do your best work. "You can do your best work at home in your nightgown. No one expects you to punch a time clock or whatever." She indicated that "she really does have a level of freedom." If she wants to have a concert, rent a hall for a concert, or get a picture in the paper, she can. No one tells her this is where the department should go, or that it doesn’t want to teach music of other cultures, just good safe European stuff. While people don’t always understand what she does, she believes people know there is a place and need for what she does.

Disciplinary Context

Professor I provided a mixed response concerning whether her department or disciplinary field encourages or discourages entrepreneurial behaviors. While her department generally encourages entrepreneurial behaviors, it may not be in terms of making money, although she indicated she was not certain of this. She has a sense that if you “have a whole gig on the side”, there is an expectation you should be focused on university responsibilities as opposed to “running off” and consulting in other areas. She stated, “on the other hand it is pretty much acknowledged that if I go do a talk somewhere or if I get in the newspaper or if I bring my group to do a lecture at a local school, that is an extension of the institution, and that we are out there as ambassadors of the university, waving the institutional flag, this is creative educational activity that is coming out of the faculty and I think it works.”

Professor I’s discipline highly values work products such as articles, books, documentary recordings, and documentary films, with the “commodity par excellence”
being print media. She indicated that products such as performances and performance recordings (CD’s) may be valued, but not as much as print media. Professor I noted that every department that has faculty with varied types of media has a problem figuring out a scale to assign value. Professor I’s c.v. includes traditional activities such as publications in refereed journals, conference presentations, teaching, service on institutional committees, and professional society roles. She indicated that it is rewarding being involved in departmental and institutional governance and service. Some of her governance or service-related activities include serving on women’s studies committee, the international studies committee, and Middle Eastern studies committee, and chairing search committees. She suggested that involvement in governance is generally good because “it gives you the opportunity to really make the place cook.” However, she suggested that it might not be rewarded in annual merit reviews.

In contrast to working conditions that Professor I suggested promoted freedom and autonomy, were her observations concerning central administration’s assessment of her courses. She noted assessments by central administration can be time consuming and represent a frustrating distraction for her. Requirements, such as those that require her to submit an application, and provide information such as course syllabi materials, and samples of student work and other information about her teaching, require time for her to assemble, and gives her some sense of administrative interference with her teaching. To make courses count as general education requirements, she has to demonstrate that her anthropological approach to music represents a way of teaching world cultures, and she has to explain how that fits under requirements relating to global history and cultures.
Professor J (Arts and Humanities)

Background Information

Professor J is a professor within the classical studies department. He began at the study institution as an assistant professor twenty-two years ago and was promoted to full professor nine years ago. His Ph.D. is in classical art and archaeology. Professor J is chair of the department, that includes six professors and additional adjunct instructors. He also previously served as department chair. Professor J teaches courses in the languages of Latin and Greek, Roman and Greek architecture, Greek vase painting, and literature and translation. His research interests include topics relating to Greek vase painting, and Greek and Roman art.

Working Style

Professor J’s working style includes the intentional division of time commitments. He devotes the bulk of the approximately nine month academic year to teaching and teaching-related responsibilities, such as advising, grading, governance-related work, and some work relating to research projects. Professor J’s most concentrated time for writing and original research is the approximately three-month period during the summer months. For many years he spent the summer months in Greece, Germany, and other countries. During this time, especially early in his career, Professor J was able to focus on his research. He utilizes original resources not readily available at his home institution. During those times of research, he collaborates with other scholars in his field, and conducts research in museums and libraries. These research activities help him prepare for teaching by giving him opportunities to take photographs for use in his classes.
When thinking about how his activities may compare to his departmental colleagues, Professor J suggested that his department has undergone substantial change since he began at the study institution. In the past, he maintained a larger research agenda than his colleagues, but that is not necessarily the case today. Professor J suggested that in the past he did not collaborate on research projects with his institutional colleagues. For many years he was the youngest tenure or tenure track professor in the department. His older colleagues were less interested in research, and given the broad spectrum of topics in his field, few projects overlapped. Professor J indicated that in an earlier generation of faculty within his department there were “a lot of people who taught and taught well for nine months, and then they painted their house during the summer instead of going some place and doing research.” Today, while there is not necessarily less emphasis on teaching, the emphasis is on being well-rounded. Professor J suggested research is a part of the scholarly life and part of being a good teacher. For example, Professor J indicated that his freshman seminar materials are often derived from his current research. Concerning departmental dynamics, Professor J thinks that in a department of six, he doesn’t “think you want one person and five clones. I think you need a variety of different types to make things fly.” In that context, Professor J suggests that it is appropriate for professors to carve out areas of emphasis. For example, some professors may prefer to extend themselves by providing extra private tutorials for students, rather than emphasizing some other area of work.

Professor J does not consider himself entrepreneurial. He suggested that someone might think that he is because he regularly obtains grants to do his research and grants for
other projects. In addition, he is invited to give lectures, provide advice, and review manuscripts. He stated, “I wouldn’t say I am entrepreneurial. I am somebody that is active and interested in teaching and research.” Professor J suggested that anytime you are applying for grants, “putting together a package to convince somebody that they should give you money, you are being entrepreneurial.” He described obtaining a grant for a major exhibition as a complicated activity. When applying for grants, he tries to determine what the funding source requirements are, and noted that the same application that would not work for one group, may be perfect for another. Professor J believes it is essential to learn the funding source requirements and present it their way. Concerning exhibitions and some grant activity, Professor J suggested that there is a group of people with similar interests that he often works with one or another of them, on various projects.

Organizational Conditions

Professor J indicated that what he needs from administration is financial support and flexibility, so that solutions can be reached together rather than adversarially. An institutional condition that Professor J suggested has been helpful in enabling him to productively pursue his research agenda is the tendency for the institution to use grant-funded leaves in order to spend time, sometimes a full year, on research. He indicated that if he obtained a grant for a project that is equal to an amount less than his salary, he suggested the institution allows him to take the grant, make up the salary difference, and use the grant funding to pay adjuncts to assume his teaching responsibilities during the period of the grant. Professor J noted that “allowing you to get a major grant to have a year off by being able to make up all or most of the salary difference has a big effect on
me. It allows me to get off more than I would have been able to, and therefore to be a more productive, happy, congenial colleague."

Professor J believes there is time for him to provide institutional service and participate in governance activities. He indicated that he has served on most major university committees, and has chaired a number of them. Most governance and service can be done during the school year when he is not involved in as much original writing. He stated that “I have to order photographs. I write book reviews. I will re-write texts that are nearly done, and edit them. Those things I can do research-wise. While I am teaching, I steal a half an hour or an hour a day. Otherwise there is plenty of time to do service.”

Disciplinary Context

Professor J suggested there is a trend toward inter-disciplinary work in his field. Anthropology and literary theory are two fields that influence his work. In reflecting upon the approaches to his field, Professor J suggested he “realized that some of the old that people want to throw out is important, but the types of questions asked by the new are also important. According to Professor J, the most valued categories of work products in his field tend to be very traditional. The field tends to value corpora (bodies of material), basic publications, excavation reports. Rigorous overviews of the field are also important, but not those that are “cheeky” or meant to entice the reader, but with little scholarly value. Professor J provided an insight concerning how he believed peer-reviewed scholarly work is evaluated by publishers. He believed most good presses try to make some attempt to use reviewers who would be sympathetic or at least not
antithetical to the approach of the researcher. That approach gives the writer a better chance for an evaluation of the work itself rather than an evaluation of the methodology or theoretical approach.

Professor J’s c.v. included multiple categories of activities in which he is involved. His c.v. lists work products such as books, refereed articles, reviews, electronic publications, scholarly papers, chaired sessions and serving as respondent, fellowships, grants, and awards. He has chaired sessions, and served as a referee. Additional disciplinary involvement includes holding office within professional societies, serving on editorial boards, serving on various disciplinary committees, as well as on promotion and review committees.

Professor K (Arts and Humanities)

Background Information

Professor K is an associate professor within the modern languages and literature department. She has been employed by the study institution nine years, beginning as an assistant professor. She was promoted to associate professor in 1999. Currently, Professor K is working outside of her home department. She is serving an academic administrator for a center. In this capacity, she is developing center programs and continuing to advance her own research agenda. Professor K’s primary areas of scholarly research are cultural studies, Latino cinema, and Latin American and Latino identity issues.
Working Style

Professor K organizes her workspace as a useful pre-writing strategy, and indicated that “if my space gets clear, then my mind is clear.” She used to think her organizational routine was procrastination but now realizes that while that may be part of it, organizing her space helps her ease into her work. She thinks “it is also a way to just get under control all of the others things that we think about in our lives. So while organizing, I can passively put everything in its category to free up my brain work category.” For writing projects, Professor K needs large blocks of time. Often she will use large blocks of time on weekends, in her office or at home, for writing projects. Very early morning hours are also valuable to Professor K. Sometimes when writing an article or a book chapter or a grant proposal she stated that she prepares the night before and then wakes up at about 4 o’clock in the morning, “fires up the computer and coffee maker, and writes.” Concerning her early morning productivity, Professor K commented that “my brain does not function well after dinner, so part of it is just survival. There is all that work that needs to get done, and I am no good at doing it in the evening and so it means I add the time on in the morning.”

At times, Professor K will try to protect her time in the office. She will indicate that she can be interrupted, if necessary, but if a question can wait, she prefers her staff to hold them. When in this mode, she does not take telephone calls and avoids e-mail for one to several hours. It is not realistic to do that more than once every two weeks or so because she does not want to inconvenience others and realizes she must respect everyone’s busy agenda. However, if she is “really under the gun”, she will close her door. Professor K attributed part of her desire for organization, structure and efficiency
to growing up in a large family where it was important to make the most of available resources. She expressed her enthusiasm for her current position and her desire to be a good steward of the resources entrusted to her. Professor K pointed out the desk that she purchased at an auction for $2.50. Spending more on her desk would have meant less money for center projects such as student scholarships. Professor K described her position as exhilarating, and does not “want to let any grass grow under her feet.” She believes she must act efficiently with both her time and financial resources.

Professor K suggested that she enjoys collaborating with people on projects, and stated that “human relationships and rapport are fundamental in my productivity.” She indicated that she needs to attend symposiums to understand issues. For her, interaction is critical and keeps her motivated about her field. She can’t imagine devoting her professional life to something that does not have a lot of people contact. Her idea of a great work week is one in which she has to be out and about. A week like that motivates her, especially after she has been doing a lot of routine work. Less structure is appealing to her. She said that if she is “just filling in a page that someone else has written, I could easily get bored, but if I see that there is a fresh page that I get to write whether it be going to a conference or a film festival or going to meet a potential donor or scholar that we want to invite to campus, all of those things have a lot of directions, and I am excited by helping them move in a direction that is meaningful to the university, my colleagues, and my own work.”

Professor K indicated that the routines and demands on her time are different for her in her current administrative position than in her regular faculty position. Her current
position requires her to spend more time in her office. She generally works long days, with many evenings and a portion of the weekend devoted to special topic programs or social events sponsored by the center. Simultaneously, however, the release from her demanding teaching schedule enables her to pursue projects that otherwise she would not necessarily have the time to pursue.

Professor K described two projects that she suggested could indicate an entrepreneurial or innovative approach to her work. One project involved an approach to teaching a course she taught in a fairly traditional department. This course was a Latin American theatre seminar. In lieu of a final examination for the course, she required students to participate as a team to develop a play. She noted, “I wanted us to do it, as a team, and so I got permission from a Cuban playwright whose work had never before been translated into English; got permission to publish it, and as a group we did that and it was the first time this playwright’s work had been published in English.” The project represented a “way to move out of the traditional construct of how to evaluate students, to get away from thinking about that grade, and have students think about the process and get really excited about a joint product.”

The second project described by Professor K as potentially entrepreneurial is a current project in which she is developing a foundation that will involve faculty and students in examining issues of identity and transformation. The foundation will be driven by an inter-disciplinary framework, and will build from a core of faculty and students to seek ways to develop community at the study institution, and the study of issues relating to identity. It will involve critical thinking for students in thinking about who they are and why they see the world the way they do. The foundation will help
students looking at identity not as just origin, but also as a destination. It will help them
determine where they want to go with a sense of who they are, and their relationship to
their community and nation. According to Professor K, the foundation will link closely
to some issues involving perceived tensions between local communities and increasing
globalization. Professor K suggested that she wanted to create a foundation that would
send out tentacles embracing different disciplines and modes of thinking.

Organizational Conditions

Professor K suggested that conditions within her home department, especially
relating to the availability of resources for professors, and a course load that included six
courses per year led her to accept her current position with the center. She indicated that
resource constraints were at times so severe “morale was low, funding was almost
nonexistent; we literally had times when there wasn’t chalk on the blackboard and there
wasn’t money in the budget to buy chalk. We had days when we had to drive over to
Kinko’s to make photocopies because the department didn’t have enough budget for
paper at the end of the year.” Initially, Professor K said, “I thought this is too small a
thing to hold us back and I would just go buy chalk for the department; $10 of my own
money and it saves fifty people the headache of finding a blackboard with no chalk, but I
think it was a series of moments like that which led me to think that although I love this
institution, and the students are great, I just need to find a way to be who I am and not
have these roadblocks that are so mundane.” She indicated that at times people around
her “are focused on the small annoyances, and it really impeded our work on the big
picture.”
After having served in an administrative position for three years, she says, "the grass is greener in some ways, but it isn’t in others, so I think I have a real good sense of what the perks are to having a teaching and research identity and what the downsides are and what the perks are of having an administrative identity." In this regard she noted, "I think someone said that one can go into administration too early, and one can also stay in administration too long and I think as long as I have space to move here, as long as I can see being entrepreneurial as part of my spirit, this fits really well with me."

A condition that Professor K suggested can inhibit her productivity in her current position involves a situation that she said is common on campus, and that is a lack of an adequate size support staff. She suggested that their office is understaffed to the extent that she and the director of the program make their own photocopies and arrange their own travel. She attempts to minimize the amount of time she spends on those types of activities. She suggested greater resources to "enhance our support staff and student assistants would certainly free up more time."

*Disciplinary Context*

She has explored topics such as globalization of culture, influence of cinema on the development of a national identity, and how cinema and other forms of expressive culture are cross-fertilized. Her work is inter-disciplinary and incorporates content from Spanish, literature, and cinema. Concerning her recent project concerning cultural identify, she noted that the project is very self-consciously inter-disciplinary. She and other developers of the programs firmly "believe that by engaging faculty from a variety of disciplines and students trained in different modes of thinking, we have the greatest
gain.” She suggested that she wanted to create a foundation that would send tentacles out across disciplines... and embracing all different kinds of disciplines, and modes of thinking.” Professor K noted that in her work she is not content just to create knowledge, but that she wants to make a larger contribution. She indicated that it may sound corny but she would like to improve the world in a small way. She indicated that through her work she wants to build bridges. One project she leads involves a lifelong learning program that enables representatives from her institution to travel to a foreign country to exchange ideas. She suggested that while she is realistic enough to know that she is not going to single-handedly change foreign relations between the two countries, but thinks that as an intellectual it is important to “make inroads in ways that I see are important.”

Professor K indicated that attending professional meetings is important to her, not only for information-gathering purposes, and for building a network, but also for her own intellectual energy. Since her work concerns contemporary culture, she enjoys working with primary sources, and needs to “deal with people; artists, filmmakers, writers, critics.” She contrasted her working style with a Shakespeare scholar who might work very differently with a greater need for archival documents.

Professor L (Arts and Humanities)

Background Information

Professor L is a professor of English and linguistics. He teaches introductory and advanced linguistics classes to undergraduate students. Professor L’s work is influenced by the fields of anthropology, sociology, psychology, philosophy, and languages. The philosophy of language is a topic to which he has devoted considerable attention.
Professor L has been awarded an institutional and state teaching award. He has published ten books. For seven of these books, he was either the sole author or co-author; the other three books he served as the primary editor.

*Working Style*

Professor L suggested the type of work he performs varies greatly depending on whether he is working in a semester in which he is teaching classes, or a semester in which he is devoting substantially all of his time to research and writing. During a teaching semester, the greatest portion of his time is devoted to teaching-related responsibilities, editing for a journal and book series, and professional association-related work. For that type of work, Professor L suggested he needs to be in his office. Concerning institutional service-related work, he indicated that he feels a certain responsibility to "administrative stuff" and that he tends to "tune in and tune out. For the last couple of years he has been more involved in administrative matters, but now he is on academic leave, and "will probably go two or three years without doing much committee work."

One of the most obvious areas in which Professor L expresses an entrepreneurial working style is his success in writing and obtaining funding for prestigious awards from organizations such as National Endowment for the Humanities and the Guggenheim Foundation. Three times during his career his grant awards, combined with university-funded leave from his academic institution, enabled him to devote two consecutive years to his scholarly research. Due to his success writing proposals, colleagues often ask him to review their proposals. When asked about his success in this area, Professor L noted
that it is important for him to identify a topic of interest both to him and to a national
evaluation panel. Once identified, he tries to write the proposal in a way that sounds like
something the panel would support. He suggested persistence and applying all the time
are important in obtaining grant funding. He noted that in some respect applying is like a
lottery “all you need is for one person for some reason to take against you or your project
and you are dead in any one of these things”, so it is important to keep trying. Regarding
grant funding, Professor L acknowledged that with peer-reviewed rewards, “success
breeds success, no doubt about it.”

Professor L described work he has done relating to a major professional society
within his field, especially work done earlier in his career, as potentially representing an
entrepreneurial working style. He has served as editor of a disciplinary journal, and spent
a substantial amount of time and energy working on issues and working with publishers
and potential publishers. Some of Professor L’s activities in that regard included
contacting people to see who was working in interesting areas, getting people to publish,
recruiting authors and helping them negotiate with publishers, and making
recommendations to publishers. He indicated that he still serves as the editor of a book
series, but does not make this activity as high a priority as other areas of his work.

His work is read primarily by scholars within his field, with all of his books
targeted toward scholars or students in the field. However, one of his books, a
collaborative effort with a leading primatologist, relating to language abilities of the
bonobos, a close relative of the chimpanzee, generated substantial media attention. For
this project he was featured in a full-length documentary in Canada, a U.S. PBS
broadcast, national morning news/talk shows, and in the national print media.

Concerning that experience, Professor L acknowledged that it was interesting at the time, but that he does not miss it.

Professor L expressed a preference for extended blocks of time for focused research and writing. His office time is frequently used for routine activities relating to editing, and teaching related activities. A “writers’ cottage” detached from his house and a summer residence are helpful to him during times of focused writing. Professor L noted that when writing “it becomes obsessive...where my mind is always pretty much...in the shower...on the bike going back and forth to work...there all the time.” He believes it is important for him to hold to some level of routine. He indicated that nearly every day, even during vacation times, he tries to reserve at least some time for writing, usually during the morning hours. During each weekend day, Professor L usually devotes at least one block of time, to working. Focused time for research and writing have been important to Professor L’s scholarly productivity.

Organizational Conditions

Professor L indicated that his primary needs from administration included “encouragement, financial support or time off to do it.” Internally funded leaves are important to him, and freedom to move and be flexible to make changes. He prefers not to be required to work in certain directions, but rather enjoys the “freedom to let his interests be his guide.” Professor L indicated that it has been helpful for him to be affiliated with an institution in which his disciplinary area does not have a graduate program. “Graduate program responsibilities are time consuming if you are going to do
the job well”, says Professor L. In addition, he says it is essential to work within the mainstream of your field or you will not get your students jobs. As such, Professor L has much more freedom of thought teaching undergraduates, and the study institution has helped him in that way. Linguistics is a tough field to find employment for Ph.D graduates. To do so you must be working in approved areas, and working hard to promote the students through long reference letters and making contacts on their behalf.

Disciplinary Context

Professor L describes himself as somewhat of a maverick in his disciplinary field. He stated “linguistics is a very straightjacketed field. There are institutional reasons for that as well as purely theoretical, with very narrowly defined methodology, with worthy projects that one might do and ways of approaching. I don’t conform to those. I’m doing things out in ten different left fields.” Long ago he recognized that there was a certain disciplinary perspective that he did not share with academics in his field. Professor L stated, “whereas the trend is to look at language …as only a slightly different version of the same formal structure…very mathematical, computational, cognitivist approach to language…mine is opposite, viewing language as a cultural construction that can’t be separated from cultural habits and uses of the people who speak it.” Despite limited affiliation with some disciplinary peers, his work, as evidenced by his extensive publication record, is well received by journal editors and publishers. Professor L suggested that his academic education at Oxford may have had some influence on his style that draws from many different disciplines. At Oxford, his academic program included opportunities for him to explore many subject areas in varying degrees of depth.
Background Information

Professor M has been employed by the study institution for eighteen years, rising through the ranks from instructor and assistant professor, to associate and then to full professor of physics in 1997. In addition to professor of physics, he is serving as acting dean of graduate studies and research for the Faculty of Arts and Sciences. Professor M is a theoretical physicist. Some of his topics of research include nonlinear dynamics in plasmas and fluids, and time series analysis with applications ranging from plasmas and fluids to nonlinear optics and biological systems. Teaching topics include classical physics, waves, cosmology, astronomy, and mathematical physics. Professor M’s work has been supported for many years by the U.S. Department of Energy as part of the nuclear fusion program. A substantial portion of his work concerns physics theory in understanding properties of matter that could lead to breakthroughs in identifying alternative sources of energy. Professor M suggested that his time commitments include approximately 40 percent for teaching, 40 percent for research and 20 percent for service. The percentage for teaching includes classroom time, as well as time for classroom preparation and student advising and mentoring.

Working Style

Professor M described his working style as one that highly values collaboration, both with faculty colleagues at his institution and at other universities. He also likes to work closely with students, especially in helping them develop their research topics. Professor M indicated that he has two long-term close collaborations with professors at institutions away from his home institution. Those collaborations involve a professor
with a university in the United States and another with a professor at an institution in Italy. Professor M indicated that he has regular meetings with his students, and when carrying an administrative load, often meets with them as a group. He asks his students to make regular oral reports on their research projects, and leads a discussion among students of ways to move the research forward. Professor M thinks it is important to "push the envelope...being comfortable interacting with people who are quite expert in an area...being willing to say you don't know the answer...using that as an opportunity to understand holes in your own knowledge and identify potential research areas."

Concerning working in small collaborative groups, Professor M indicated that he likes to work with "highly motivated and creative people." He says good working relationships can be like "molecular bonds", with properties of forming tight bonds and then reforming into different bonds. People may work together tightly for a while, and then they may reform to work with the same person or group, but on a different problem or work with different people or a different problem.

Professor M characterized a recent project, acting both as interim dean of graduate studies and research, and as an interested faculty member, as an expression of his entrepreneurial working style. That project involved working on a proposal to a state agency that resulted in substantial funding for academic researchers, and served as a hook to encourage a company to relocate to the region. Representatives of central administration assigned the project a high priority. During the course of the concept development/proposal development, Professor M devoted substantial hours to the project. He worked on portions of the proposal, edited, and acted as a consultant or facilitator, addressed concerns of principal investigators, and performed a brokering role with
faculty to address their needs and concerns. The project involved collaboration among
the president, provost, economic development office, department chairs, and individual
faculty from several academic disciplines.

Prior to assuming the responsibilities of acting dean, Professor M assumed the
responsibilities of developing programs of a newly created graduate center. He has a
strong interest in helping graduate students prepare for the multiple roles they may
perform within academia or outside of academia. He maintains that graduate education,
especially within the hard sciences, is often too narrowly focused on academic content,
and does not always prepare students in "soft skills" such as in areas of human relations,
presentations, and in obtaining funding to support a research agenda. In this regard,
Professor M wants to develop a workshop series or a short course on how to write
proposals to obtain resources. Professor M suggested he wants to structure the series to
assist students who want to be faculty, as well as those whose goal it is to start a business.
He says "there are certain commonalities; how do you take an idea; how to turn dreams
into reality. That is what entrepreneurship is all about at its heart because when I think of
entrepreneurship, I think of it not as just going out and making a lot of money. I think of
it in terms of those skills that allow you to turn your dreams into something real."

Professor M believes students who develop skills in obtaining resources and other
skills they will need to succeed will help students feel more satisfied because they will
feel empowered. He believes entrepreneurism is a form of empowerment and encourages
people to obtain the skills they will need to succeed and to pursue their creative
aspirations. Professor M suggested that his involvement in the development of the
graduate center may have been one of the major reasons he was nominated as an academic entrepreneur. He noted that “this is a very big entrepreneurial activity in that we are trying to create something from scratch, and in doing so I’ve had to broaden my exposure to what is going on in other schools and programs.”

Organizational Conditions

Professor M described some of the challenges for faculty in juggling multiple roles. He suggested that if administration wants faculty to be involved in special projects such as developing graduate centers, or intense involvement in major proposals involving faculty from multiple programs, it is important for administration to understand that other activities may receive less emphasis. If the institution wants to have these kinds of activities, he believes they need to allow faculty the flexibility at different stages in their careers, to make these different choices. He noted that, during this period of serving in an administrative capacity, it was important for him to continue to focus on his research. Professor M noted that by and large that he thinks the administration is excellent. Administration plays an important role in helping set priorities and in helping obtain resources. He said that sometimes “what can get missed when you are in the trenches is how limited the maneuverability is for higher administration. So sometimes faculty blame the administration when in fact the administration may have had no choice.” He listed the state coordinating board, the institutional board and the state legislature as having an impact on issues that affect the faculty.

Professor M believes that when things are going well, management is at its best when it is invisible. An administration that ensures its people have the resources and
tools they need to get the job done, then gives them the space to achieve their goals is preferable. When things are not going well, then administration needs to step in and make some hard decisions, and explain why the decisions went the way they did and then move forward. Professor M believes the present administration expresses this management style. He noted that morale suffers when administration “waffles”, and that it is impossible to make everyone happy all of the time. People need to understand the reasoning behind decisions and how they fit into the institution. With this understanding, they can better understand the “win some, lose some” reality.

Professor M suggested that he is very impressed with the high quality job that the institution manages to do with a limited support base. He commented that he is impressed with the commitment faculty has to their students and love of their research and with their willingness to work long hours despite little support staff. He noted that faculty at other institutions performing this high level of research have more secretaries, business managers, and more technicians. At his institution, faculty and students perform roles that would be performed by support staff at larger institutions. While he says this situation “tends to be less productive, the faculty do have leadership.”

Faculty ownership or governance of academic issues is important to Professor M. He indicated that the committee structure is complex and time consuming with involvement in issues such as designing and implementing curricular change. He believes the institution needs to provide an adequate infrastructure with network connections and facilities in a building so that faculty can compete for research projects. In that regard, he suggested that the institution could not be expected to provide
everything, but should at least provide an adequate infrastructure so that faculty can fairly compete.

Layers of assessment and evaluation according to Professor M are a potentially inhibiting working condition. He noted that over time, assessment and evaluation-related responsibilities have increased substantially. At one time the only evaluation was when faculty were reviewed for tenure. He indicated that he supported a serious midterm review for pre-tenure faculty to determine faculty achievement. Without this, it is easy to let things drag on for six years and then make the cut. According to Professor M, additional assessments, such as state mandated post-tenure and promotionary review and annual merit reviews, are very time-consuming. He suggested that post-tenure reviews are serious reviews requiring all of the same information as tenure reviews, except for external evaluations. Professor M says the “amount of information that has to be collected, assimilated, and presented in some coherent fashion is extraordinary.” He does not favor off-loading that responsibility to “some office on campus that’s de-coupled from academic programs, with an argument that they would not be competent to evaluate the data”, but that evaluations take up a lot of time on top of all of the other activities professors are involved in such as teaching, research, seminars, and one on one activity with students. Professor M noted that within a small department, some people get saddled with everything. Since the institution has a tradition of being lean with respect to support staff for academic programs, often the department chair or a few committee heads within the department wind up having to do things that in other places would be performed by an administrative assistant.
Disciplinary Context

Professor M suggested that within his department, peer-reviewed publications are the most valued work product. Sponsored research funding is also valued. He indicated that in a competitive climate for funding, the institution hires people that it feels are competitive to acquire this type of funding, expects the faculty to compete for funding, but understands that sometimes funding is secured and sometimes not. Therefore, simply because a professor does not obtain a big grant by the fifth year does not mean he or she will not obtain tenure.

Patent-related work is also valued work, but Professor M suggested that it is far too early to determine how it will fold into the reward systems in academic departments other than applied science. Academic departments may view it as great, but not a substitute for refereed journal publications. Professor M noted that sometimes when a professor does something out of the ordinary, it is difficult to categorize it for merit review purposes, and thus, it may end up in a service category. He says the service category is “always the smallest box among the three.” When people tend to do more in the service category, their merit review tends to suffer because reviewers don’t quite know how to weight the boxes, and also people may “see that you are not teaching as much.” While Professor M doesn’t not feel that this has happened to him in physics, he has heard the complaint from others that they can be penalized for taking part in service.

Professor M noted that on his campus there were two ways to describe research; curiosity-driven or problem driven. He noted that to be crude about it, physics represents curiosity-driven research and applied science represents problem-driven research. He
suggested this representation is too simplistic because there are certainly people in
applied science who do research that is just as basic as that done in the physics
department, although there may have been some problem that initiated the research
question. Professor M noted that his research lies somewhere in between curious and
problem-driven. The fusion program funds his research and the ultimate goal of that
program is “to develop a practical energy source.” He noted that developing an energy
source with nuclear fusion as opposed to fission is an extraordinarily difficult technical
challenge, one of the most difficult challenges we face as a species and that is the
problem that drives our questions.” He indicated that some of the questions that come
from that problem, how to heat a plasma to heat energy waves, how energy gets
propagated into plasma, are all fundamental physics issues still with aspects we do not
understand.”

Concerning the influence of federal funding on scientific research, Professor M
suggested that due to a generation of lack of funding, he believes that American science
has become very conservative. In a conservative climate, rewards tend to go to people
who can make a strong argument concerning direct mission relevance. Agencies don’t
have very much flexibility to support work that is high risk. Because that type of
research is high risk, it means most of the time it does not pay off. In the few programs
he has direct experience with, he suggested program managers have to make sure their
program portfolios have projects that are “sure things”, clearly of direct relevance to their
agency mission, although during some years there may be some funding left for work that
is categorized as a higher risk.
Professor N (Natural Sciences)

Background Information

Professor N has been employed by the study institution for thirty-two years. He has held a variety of positions, including associate professor, professor, and dean of graduate studies and research. For many years he has also been affiliated with a federal scientific laboratory located in the region performing a variety of scientific and administrative roles. Currently, he is serving that laboratory as interim theory group leader, with his time divided between research and administrative responsibilities.

Professor N is a theoretical physicist whose topics include relative field theory, and relative quantum mechanical equations for few body systems. His research has been supported by federal grants for many years with the National Science Foundation, and U.S. Department of Energy representing the major sources of funding.

Working Style

Professor N suggested that his working style and time commitments for various functions have varied throughout his career, depending on factors such as teaching load and administrative responsibilities. His working style includes extensive collaboration. He noted that he takes an active role on all of his collaborative projects, and is never content to let collaborators do the work and put his name on the paper. Professor N indicated that sometimes he may take on more than he can handle, with several current papers behind schedule. He noted that he may have multiple projects underway simultaneously, but one project is usually predominant. That is the project he is trying to complete. For the other projects he will just do what is “necessary to stop up or repair the dam” until he can devote his attention to the project. Although Professor N prefers a
style that involves extensive focus on one project at a time, he indicated that in reality he may work on more projects simultaneously than it may first appear.

Professor N suggested that his best time for working is often the morning hours when he has the most energy. However, he will often go to bed early, and wake up in the middle of the night and work on a project when he feels fresh temporarily. This is the case when he is working on papers in which there is a missing idea. Professor N sometimes finds that idea in the middle of the night. Sometimes, he stated “the best part of the paper is discovered near the end of the work when you are looking back over the whole thing and you have some slant that really makes it come alive and somehow makes it more important than it was beforehand, when it was just a loose bunch of pieces, that somehow didn’t jell.” Professor N noted that at times during his career he worked on projects until two or three in the morning, especially editing text, but that in reality was more than editing “it was setting a kind of framework and adding new ideas.” Professor N suggested that his working style includes “not wanting to publish any paper until I think it is as good as it can be.” He noted that high standards are important to him, but that sometimes “it is a double-edged sword.” If he is too meticulous he is not always sure of the return on the investment of energy, but it is “really hard for me to finish something unless I feel comfortable with it.”

When working on projects that involve collaboration or influencing a group, both from a scientific perspective and from an administrative one, Professor N noted that it is important to know as much as you can about a problem. He suggested that sometimes problems in not resolving obstacles come in not knowing about some aspect of the
problem before hand and being off track because of it. Professor N noted that he wants to know the agendas, including hidden ones. He wants to know the limitations of an opponent in order to present a solution within the bounds of those limits. In order to maintain the stature of his institution or his contribution, Professor N noted that his strategy is often to do a lot of the work, to make himself “indispensable. In that way he can’t be ignored or overlooked because he is a key player. If there are small meetings in which serious decisions are made, he is considered too important or having done too much of the work not to be there. He often will assume the role of secretary, contribute actively to every meeting, make proposals, and participate in discussions. In any group, Professor N says, “you need people who are paying attention and willing to contribute to the process.”

Professor N indicated that he may have been nominated as an academic entrepreneur for his substantial role in developing an important federal research laboratory in the same region as his university. He noted that his work on that activity may have been a project in which he had his greatest impact, with ideas that came up in discussions being implemented. Professor N’s role included work on the scientific proposals that were influential in describing the unique potential uses for the scientific equipment that the federal laboratory would contain. In addition, a role he performed on this project related to helping establish a consortium of scientists from research universities that would conduct experiments utilizing the federal laboratory. Professor N helped organize a consortium of scientists that represented scientific credibility that could not be ignored. In this role, Professor N provided leadership by organizing meetings, pulling together experimentalists, and making recommendations concerning the merits of
the scientific proposals that were submitted. Throughout that process, he emphasized that
the scientific proposals should be for projects that could only be conducted with the
equipment that the new federal laboratory would contain. That consortium of universities
since its existence has created approximately 70 faculty positions to support work at the
federal laboratory. Hundreds of experiments have been conducted using the scientific
assets of the federal laboratory. Professor N described his involvement in this project
that occurred over the course of several years as very satisfying, and somewhat of an
unusual occurrence over the course of his career.

Although expressing some hesitancy concerning the extent of his entrepreneurial
activity, Professor N described some of his other career activities that could be
considered entrepreneurial. For the most part, he views the types of activities he has been
engaged in as “fairly typical for a theoretical physicist in a physics departments all along,
but the work is creative and innovative so he could respond at that level rather than how
it may be entrepreneurial.” Professor N’s work is theoretical and basic rather than
applied or experimental, although his work is informed by the work of experimentalists.
He has been able to maintain consistent grant funding for his research with the National
Science Foundation and U.S. Department of Energy as important contributors to his
research. Some of Professor N’s funding has paid for Ph.D. students and post-doctoral
employees. Concerning federal funding, he noted that after getting established in the
system, the “main thing is to continue to do good work, and to show productivity and
results, and that work is maybe entrepreneurial and maybe not. It depends on how you
look at it.” Professor N noted that every three years he has to write a 70-80 page major
proposal regarding plans for the next three years explaining what changes he will make to
his research. He noted that grant funding provides an opportunity to conduct research, but that grant support is not mandatory. Concerning grant funding, Professor N indicated that he thinks of it as “routine, standard in some ways.”

Professor N suggested it is important to have the resources to do the things you want to do. In the physics department, professors typically saw it as their responsibility to obtain funding from agencies because there were plenty of opportunities for funding. Professor N noted that he believes “it is much harder today than when I started out.” He suggested that applying for grant funding is so time-consuming and full of special requirements that sometimes “some of the best groups aren’t getting funding because they do not want to put in all the effort with a low probability of getting funding.”

Contracts and licensing agreements with industry does not appear to be a particularly important area of support for Professor N.

**Organizational Conditions**

Professor N noted that some level of respect or collegiality within a department is important to creating a positive working environment. Intangible things can influence the quality of the atmosphere such as the extent to which colleagues are interested in their subjects and working on them actively, and whether there is an atmosphere of mutual respect within the department. At one time he benefited from faculty study groups in which faculty members took turns lecturing on a topic and leading discussions. He noted his department is very collegial on the whole, and any complaints he has “are small potatoes compared to what exist in some departments.”
Professor N recently completed service to the study institution as dean of graduate studies and research. Among other accomplishments in that role, Professor N indicated that one of his ongoing activities that he thought made some impact was to use some of the discretionary funding that he had available for faculty research to give to faculty who did not have ready access to sources of funding, especially faculty in the humanities and social sciences. He suggested that sometimes even a very small amount of money could help a professor attend a conference or engage in a research project that he would not do otherwise. Professor N noted perhaps the small amount of funding may provide a psychological lift by validating in some small way the work of an individual professor, and help unlock pent up feelings where they were held back. As dean, Professor N suggested that he had opportunities to be creative since there “weren’t any boundaries, and it wasn’t clear what to do.” He suggested that in his service as dean the role was expanded to include research in arts and sciences, and he enjoyed making linkages between graduate studies and research as well as making some linkages with graduate research and undergraduate research.

Disciplinary Context

Professor N has been very active within his disciplinary field. His c.v. includes an extensive list of refereed articles, a textbook, edited publications, contributions to books, published papers of conference proceedings, major reports and proposals, unpublished seminars and colloquia, as well as numerous administrative positions. Professor N has also served in leadership roles for disciplinary conferences and organizations. He noted that most of his publications are in major journals of his field, and that he would only want to be published in a journal that would be read by his
disciplinary peers. Professor N’s textbook is currently in print and used by a number of professors at institutions in the United States. His professional activities have also included active engagement in roles relating to institutional service. Some of Professor N’s roles and responsibilities in that area have included work on policies and procedures related to institutional faculty salary study, computer policy, and the institution’s leave without pay policy.

In addition to his teaching and scholarly research, Professor N, has engaged in several administrative roles in his career. He noted he has enjoyed these roles, and suggested that some of his entrepreneurial behaviors can be associated with administrative roles. He indicated that he would not want an administrative role that just involved the processing of routine things, although all administrative roles have some processing-related functions. To him, administration is exciting when he has the opportunity to do something original or to build the institution.

Professional disciplinary meetings are very important to Professor N. These meetings give him an opportunity to exchange ideas. He suggested that he often prefers to learn about the literature by talking to other people rather than by reading. While he may read about the issue later, he can often learn enough about the issue by attending a meeting. Professional meetings can be very adversarial, with people pushing their own ideas. The meetings are also tiring with some days at professional meetings lasting longer than twelve hours. In the field of physics, professional meetings do not have a reputation as being vacations as meetings may in some other fields. Often, when his
presentation is later in the week of a professional conference, he will have insights leading to developing new material to present that will fit the audience better.

Professor N, noted he has been productive in publishing his work. He indicated research papers are the most important products within his field, with books not usually the vehicle for doing research. He suggested that physics is a mature field, and scientists are working on “the little details” whereas for other fields, where there is less common understanding of things, books may be more useful. Professor N noted that throughout his career he has tended to follow a single line of research, not jumping around as much as others do.

Professor O (Natural Sciences)

Background Information

Professor O is an assistant professor of applied science. He is the only assistant professor in the study. His current position is his first tenure-track academic position. He has been employed by the study institution for approximately four years. Prior to assuming his current position, Professor O worked as a legislative assistant for a U.S. Senator. His Ph.D. is in mechanical engineering and materials science with a minor in engineering. His background also includes experience working with representatives of business and industry. The institution’s applied science department, which includes faculty members with expertise from a variety of fields such as engineering, physics, biology, and chemistry, is fairly unique among programs nationwide in that it is not linked to an engineering program.
**Working Style**

Professor O’s work relates to understanding the characteristics of electrons, and to understanding the effects of coating materials with nanocarbons. He works closely with departmental colleagues and collaborators at national laboratories, as well as with graduate students. Training graduate students is an important part of his role. His time with graduate students includes classroom time, and laboratory time. Professor O helps students identify viable research topics, and teaches them how to use the equipment, and analyze the data. After the students are trained, he gives them freedom to conduct the research. He monitors their progress, and provides guidance as necessary. He also has one project at a federal laboratory that involves his own on-going active work with scientific equipment.

Professor O suggested that he has done a lot of work that is associated with professional associations. He thinks his level of involvement may be greater than many professors at his early career stage. He believes work of that type fits his gregarious personality. Professor O noted that a lot of good has come to him as a result of contacts he has made through professional association involvement. He noted that, at this point, all of his work involves some collaboration with other scientists. Since Professor O’s field is a rapidly changing one, he teaches his students analytical skills, and encourages them to embrace adaptability as a working style. This is necessary because the specific area that they may be working on as a graduate student will likely be very different when they begin full time employment in an industrial or academic setting.
Obtaining resources to conduct research is an important aspect of Professor O's position. He solicits and obtains grant or contract support from government and industrial sources. Professor O described his involvement in the research process as involving three major steps; obtain funding to pay student stipends and for equipment, parts, and supplies; identify someone to do the work and ensure progress; and verify that the work is done right.

Professor O provided several examples of how his work could be characterized as entrepreneurial. One project involved investigating an important scientific resource at a federal laboratory near his home institution. He investigated the capabilities of how his research might benefit from using this resource, and identified collaborators including a scientist from a government agency who has experience using the scientific resource, and an established scientist in the field of carbon nanotubes. In a short period of time, this collaboration has resulted in a solid research base. Professor O said, "we think we have really hit upon something new and novel." Professor O suggested that this working style is entrepreneurial because we have "pulled together a collaborative team, ran it on a shoe string budget, put something in place, where there was not anything. I thought the capability was there, identified a resource ... that no one else has and tried to figure out how to use it in a way that would benefit my research and some of the problems I faced or found interesting."

Professor O recently obtained a share of a $1.5 million federal grant for high brightness electron research source work that he is conducting with a team of researchers from two other universities. Media attention surrounding this grant noted that the research, if successful, may have important applications leading to advancements in
many areas such as medicine, and security-related products. The research could substantially increase the capacity of sonar, radar, and x-ray equipment. The electromagnetic properties this project seeks to advance could have an impact upon communications systems used for military operations, and have implications for television, radio, cellular signals, as well as x-ray and other medical diagnostic equipment.

Continuing to refer to ways his work could be characterized as entrepreneurial, Professor O stated that “in a business sense, running the whole shebang, making sure cash in equals the work power coming in, balancing how many students you have versus how much funding you have, making sure products get out in a timely fashion. In a sense, he said there is no fall back position. At the study institution, Professor O stated that “there isn’t really enough support that if the whole thing collapsed you could pick up all of the people you are supporting.” Professor O also noted that he believes that it is “entrepreneurial in identifying collaborators, individuals to work with us and for us.” In some cases the collaborators at other institutions are important in providing access to specialized equipment. He noted that his specialty uses equipment that may cost anywhere from $50 to $500 to $1.5 million dollars, and thus some equipment is not affordable for the study institution, or practical to purchase. Professor O also noted that “just coming up with the ideas themselves…you have to be entrepreneurial to really keep ahead of the field… as far as questions you ask and making sure questions you ask today are still going to be germane and interesting four years from now.” Professor O suggested that there is an attitude within his department that the department is fairly unique, given that there are not very many applied science departments, especially ones
that are not associated with an engineering school. He indicated, "we say we don’t know who we are and we like it that way because we get to do what we want. The department is a very diverse collection of people. We have ties to biology, chemistry, and physics but are very independent from what they do."

Concerning his working style Professor O suggested that some activities such as teaching and on-campus service require a balancing act. Regarding teaching, he indicated that he could obviously "spend many more hours a week and the class would be better off for it", but there is a balancing act between "incremental improvements with incremental costs in time." When encountering obstacles, Professor O suggests that creativity and perseverance are important. Creativity, he suggested involves "figuring out an alternative route to the same goal. For example, given physical limitations on campus, he believes a creative solution is to "make sure we know enough people and keep them happy enough to help us analyze data." Professor O noted that perseverance involves "plugging through problems that other people are not willing to dedicate themselves to and being willing to put in that extra effort that others are not necessarily willing to put in." He cited an example of a recent project in which one of his students whose project involved "forty hours for one sample and he needed six samples and then a month to analyze the data. The student needed convincing to do it and do it right, but was ecstatic with the preliminary data."

Organizational Conditions

Professor O made a few observations concerning the overall working conditions of his department and institution. Generally, he suggested that he has a positive climate
for his work, but said that "less hassle and more support" would be helpful. He stated that "financial flexibility, and more financial support is critical, but flexibility in that support is also of critical importance." He also believes that more "understanding of what we do is necessary. He commented that administration, not necessarily upper administration, but managers over in facilities management need to understand what they do. For example, he stated that facilities management may "shut off steam over spring break, because it is assumed no one would be in the building, or shut off electricity for the weekend, not realizing the equipment stays on for twenty four hours a day."

While Professor O would prefer fewer restrictions, he indicated that administration has been good with flexibility. He suggested that the institution's size, lack of physical infrastructure, and lack of understanding of what he does and how he does it are some of the problems he encounters, but that these problems are not severe. He also stated that the small size of the school could be an enhancement because of the way he works with a lot of "collaborative agreements, a lot of interaction, ability to have a large say on campus...ability to have direct contact with upper administration...has been vital to my success... The fact that as a pre-tenure faculty the provost knows my name and that is not a bad thing is not something you would find at a lot of other schools."

Regarding working conditions, Professor O noted that at times he may feel some criticism concerning the emphasis of his work, which emphasizes both applied and fundamental elements of his discipline. He suggested that some scientists on campus, especially colleagues who are more fundamentalist chemists and physicists, may question
his program and why he emphasizes working with industry, making sure students are marketable, and why certain projects are pursued. In that regard, he thinks there is a saying on campus, “money is green, but NSF money is greener than green”, suggesting that some professors may view funding as tainted if it is directed to a specific application. Professor O suggested that this criticism is not serious.

**Disciplinary Context**

Professor O suggested that his department and disciplinary culture encourages entrepreneurial behaviors. He thinks you have to be entrepreneurial to be successful in his field and disciplinary culture. He noted that “running a group, especially in an academic setting, is like running a small business. He indicated that the group must obtain funding and “find the people whether you want to run a mom and pop on the corner with one employee or a small local chain of stores or a major national corporation. It is up to you and how you want to work and how successful you can be.”

In commenting upon metrics for success of his program at his institution, Professor O suggested student success, publications, presentations, attributions, invited talks, and funding levels were all important. Patents and patent disclosures would likely fit within the category of publications according to professor O. At the disciplinary level, Professor O emphasized the importance of government and industry as major shapers of his field. In that regard, he suggested that the tendency for government funding to shift emphasis can be challenging. Professor O suggested that there is “involvement more and more in kind of fads” which started when he was in graduate school. He said, “Diamond thin films were the big things. The next thing was micro electrical systems. The
government threw in hundreds of millions of dollars. Researchers jumped into the field. Funding dwindled off and the number in the field is now a fraction of what it was. The new thing is nanotechnology. The government is throwing billions of dollars at it. It is an interesting way of doing science. It puts a lot of focus on a specific area. The ones that are really good and grab on to something of interest continue to get funding. Everybody else has to find something else to do. It is a great way to get a field established, but does cause a lot of chaos for those people who jump around a lot.”

Professor P (Natural Sciences)

Background Information

Professor P has been employed by the study institution for nine years beginning as an assistant professor of applied science. He was promoted to associate professor in 1999. His educational background includes degrees in aerospace, and mechanical engineering. Prior to beginning an academic career, Professor P served as an officer in the U.S. Air Force. He is a founding member of the applied science department. Professor P’s research topics include medical imaging, non-destructive evaluation, robotics and intelligent machines, and manufacturing process control.

Working Style

Collaboration is an important attribute of Professor P’s working style. He actively seeks collaborations with government and industrial partners to advance his work. Collaboration with business and industry includes both larger, well-established corporations as well as smaller, young or start-up companies. Professor P’s work involves collaboration with scientists, within academia, government, and industry,
representing many scientific disciplines. He noted his work involves working with
approximately ten Ph.D. students, several research associates, three or four
undergraduates, three or four scientists from NASA, and three or four corporations. His
work often involves an incubation role for projects. He suggested that his working style
includes watching changing technology in areas such as medical applications and
manufacturing. He is always “riding the wave of change.”

Professor P indicated that he can work under any condition. However, he requires
a quiet place to write. In responding to a question concerning the type of activities in
which he is involved, Professor P indicated his activities included contracting with or
licensing technology, obtaining patents, earning consulting income, earning royalty
income, establishing and operating a business, as well as obtaining resources. Over the
last several years, he had been involved in grants and contracts-related projects supported
by government agencies, foundations, and industrial partners with an estimated value of
$5 million dollars.

Professor P suggested that since his program is a graduate program, his teaching
and research roles are inter-connected. Working with masters and Ph.D. students on
research projects is an important role for Professor P. He suggested that his students are
likely to go to work for a variety of different types of organizations upon graduation,
including large or small companies, and tenure track faculty positions. Professor P stated
that “our graduates are likely to go to work for high tech start-ups. They need to
experience first hand while students what their life is going to be after they graduate.”
He commented that “traditional academic science does not prepare scientists for life after graduation.”

Professor P directs the non-destructive (NDE) program within the applied science department. His work includes analysis of materials and development of processes and new materials and instruments that have a wide variety of applications. A biographical sketch obtained from Professor P noted that his “research group develops analysis techniques and measurement technologies for the quantitative characterization of materials, tissues and structures by noninvasive means. Ultrasonic, radiographic, thermographic, electromagnetic, optical, and other methods are employed to probe interior microstructure and characterize hidden surface features.” Two projects in which Professor P has been involved include development of computer software to use with instrumentation to detect prostate cancer, and technology associated with development of an ultrasonic dental probe to detect periodontal disease.

Organizational Conditions

Concerning working conditions and what he needs from administration to perform his work, Professor P stated that he needs “resources and to stay the hell out of the way.” Favorable working conditions, according to Professor P include limited bureaucratic constraints, a manageable teaching load, encouragement of inter-disciplinary work, and the availability of sabbatical opportunities. In negotiating obstacles, he prefers an environment with few rules. He likes to make up the rules as he goes. Professor P suggested that it is important not to throw up roadblocks. A concern he raised about his work environment is related to what he termed “restrictive intellectual property policies.”
He noted that "restrictive IP policies, even well meaning ones, shut off all entrepreneurial behaviors, or at best drive such activity off campus." Other working conditions referenced by Professor P that he believed inhibited his work, and the work of others in his department, involve the physical facility. He said, the "physical facilities are tragic, even the newly built ones. Even the electrical power is unreliable, worse than China or the Ukraine." In that regard, Professor P emphasized that his work and the work of other scientists and students in his academic unit are sensitive to conditions within the facility, such as temperature and electrical power.

**Disciplinary Context**

Professor P noted that journal articles and sponsored research were the most valued categories of work within his disciplinary field. He noted that important influences within his field include journal editors and reviewers, and funding agencies and reviewers. Professor P indicated that his work is inherently multi-disciplinary.

**Professor Q (Natural Sciences)**

**Background Information**

Professor Q has been employed by the study institution for ten years. He is a chemist by academic training, but his institutional affiliations have been with the applied science and physics departments. Professor Q holds the rank of professor and serves as the managing director of an applied research center. This center promotes collaboration among scientists from multiple universities, federal research laboratories, and industry collaborators. The applied science department is a fairly new department at the study institution. Professor Q has been an active participant in developing the program, and has served as chair of the department. Professor Q's research interests include topics such as
plasma physics, laser material interactions, electrostatic probes, energy analyzers, and bioinformatics. A web page reference to his work stated that his group “performs research in the fundamental science which underlies the formation and characterization of surfaces and interfaces with particular specialized properties...research includes plasma-surface interactions, surface cleaning and passivation, surface modification by particle and photon bombardment, and many other areas of fundamental and applied importance. The technology is important to success in controlled nuclear fusion, high speed aeronautics, high speed rail transport, and communications.” Professor Q’s vita noted that he has produced 200 publications with approximately 150 of them refereed. Since employed at the study he has obtained sponsored research grants and contracts valued at approximately eight million dollars.

Working Style

Professor Q suggested that at the start of a work week, he pre-schedules about thirty hours of it. The balance of his time fills in as the week progresses, with “requests that arise, unusual items, fires to fight, last minute meetings.” There are things he does for himself such as reading and studying and trying to keep up with what is new. The scheduling technique Professor Q described allows him to have some degree of structure, but gives him flexibility to respond to emerging opportunities and challenges.

Professor Q values flexibility in his working style with respect to time, place, research interests, and collaborators. He believes he has been effective in seeking partners for projects, pursuing a project or two together, and then moving on to the next project that may show promise. He likes to work in what he calls little “hiddy holes”,
which are offices or other places in different locations where he can duck into to get some work done. He believes he is especially productive in his home office where he has developed resources such as a "pretty extensive library, Internet connection, fax, separate phone line, and so forth." He stated that he has created "a virtual me so I can pretty much be anywhere I want to be and get my job done." He said his home office is his favorite place to work." For some activities he needs quiet and concentrated time, but for other activities such as grading exams, sitting in public place like a Starbucks coffee shop with background noise is comfortable for him. Professor Q suggested that the biggest enemy, for him and most people, is a fragmented attention span, and he noted finding 15 or 20 minutes or half an hour to work on one thing uninterrupted is a great luxury.

Professor Q suggests part of his working style involves looking for new opportunities by "keeping his ear to the ground." Contrary to a common working style in science that involves working on something, and not talking about it until it is complete, Professor Q suggests that he is antithetical to that style of working. He believes in "telling everyone everything all of the time in the blind hope that someone else will pick it up and do it and do it before he has to." Part of his working style, he suggested, is looking for things to help other people get started.

Professor Q commented that he likes to stimulate collaboration, even if the collaboration does not always come back to him. He said, "it is like a ping-pong game with many people on the other end of the table, and if they go off and start their own game together that is even better." Professor Q believes that good things tend to happen with "pick up teams of people" where there is "no possessiveness or any sense of real
ownership or lingering investment” He called it “a nomadic occupation, bringing together a minimum of two and a maximum of about a dozen, although three tends to be a really good number.” These groups bring together complementary skills and energy and effort and just enough cover for each other. Professor Q says “I wander through the scientific world largely working alone and I have done some things, but most of the time I find a student or a postdoc or another faculty member and a student and gather up two or three people and go after a problem and then larger things build around it. He suggested that style is not necessarily innovative saying, “that is ancient actually. I am just borrowing things that Egyptians knew about.”

Professor Q suggested that he works hard to remain current in his field and to explore new areas, outside of his area of expertise in order to pursue valuable applications of research. Professor Q cited as an example, a project on which he is serving as one of the academic principal investigators related to an emerging area of bioinformatics. He indicated he has had to read a tremendous amount to understand the topic area in order contribute to the project. He takes an inter-disciplinary approach to his work with chemistry, physics, and biology, all influencing his approach to topics.

In addition to significant activity in the areas of sponsored research, developing partnerships with federal, state, and local government agencies, Professor Q is active in identifying and pursuing licensing agreements with partners from business and industry. He works with both start-up companies and with well-established corporations. He has obtained patents for some of his research activity and has encouraged faculty working within the applied science department to pursue such activities as well.
When pursuing activities that may be described as entrepreneurial, Professor Q devotes less attention to bureaucratic administration. He indicated that he does not like “anything to do with bureaucratic administration, bean counting, pencil sharpening, making sure all of the columns are lined up.” He laughingly stated, “I have huge knuckles from being beaten by nuns when I was a kid. I have spent my whole life outside of the lines.” In responding to the researcher’s follow-up question concerning bureaucratic constraints, he suggested that the academics he associates with “detest chaos but also fear and sometimes detest order. We try to live right in between trying to create an organization that is flexible and mobile with some sense of ruggedness and individualism, but also with some sense of family and community and belonging. In between is where I like to be.” Commenting on his independent streak, Professor Q stated “Yes give me a buffalo robe and a teepee and a horse. I would rather ride a motorcycle than a commuter train.”

Concerning overcoming obstacles to achieve his goals, Professor Q indicated that a lot of times the easiest thing is to pretend it isn’t there and find another way. According to professor Q, “There is no reason to climb a mountain if there is a pass on the other side of it.” He said, “So I go around them … Sometimes if an obstacle is insurmountable, really difficult, you just wait awhile until the obstacle gives up.” Professor Q cited a current project in which he had taken on thirty years ago, but at “that time did not have the computers or personal mathematical tools I needed at the time, or the right collaborators and co-workers, so you just wait, but you don’t forget and you are ready to
pounce on it. It is a predatory point of view. The tiger doesn’t always chase the prey. Sometimes you wait and the prey comes back to you.”

Organizational Conditions

Professor Q suggested that his primary needs from administrators include money and autonomy. He acknowledged that money sometimes comes with obligations and accountability, and Professor Q said, “even MacArthur Foundation money comes with some sense that you have to exceed your peers as a writer or an artist or a pianist or whatever. No one just gives you the money, and says forget I gave you this, it just doesn’t happen.” Institutional or departmental conditions that may inhibit Professor Q’s work include too many meetings, too much regulation, too much oversight, and too much explaining this is what he did, and this is how he did it. He acknowledged that some evaluation is appropriate for departmental oversight, but expressed annoyance at going from once a year that may be necessary for departmental oversight for the purpose of evaluating raises to “ten times a year” for different purposes. He doesn’t like doing the same thing over and over, and answering the same questions, “how many papers did you publish, what did you do, how many grants?”

Professor Q expressed some frustration over the entrepreneurial climate of the study institution and the surrounding region. He suggested the region lacks a spirit of investment and adventure. He believes the area is ultraconservative. He commented, “It wants to be a tobacco farm, peanut farm, cotton farm on Monday, Wednesday and Friday and wants to be Silicon Valley on Tuesday and Thursday.” He indicated that the region does not make the necessary commitment to one or the other. He says the local area and
the study institution are antithetical to entrepreneurship in the sense “that it is risk averse as hell... It values the ancient wisdom of the founding fathers almost too much.” He suggested that people of the area have a mindset of staying in one job and retiring there. Therefore, there is not much venture capital, venues are limited, and the commitment of the universities is “limp at best.” He stated, “there really is an impediment for soft money individuals using the infrastructure of the university for commercial purposes. It is still regarded as a bad thing to use state property for gain no matter how fallow the tool is.” He also indicated that since peer reviewed work is more valuable than a multi-claim patent it “tells you the study institution is not there yet, not entrepreneurial. It still values intellectual purity, still wants to dance with the angels, and the angels unfortunately do not start companies, and they don’t sell products.”

In addressing a question of whether Professor Q encounters any criticism or risks associated with his entrepreneurial behaviors, he noted that “people consider me a renegade. My own boss, whom I love, has mentioned that I am an enormous pain ... I am an enormous pain..., and people who do not like to stick by the lines are a pain ...It is like having a great hunting dog that won’t come back every time you whistle.”

Concerning his management style, Professor Q indicated that he likes to surround himself with the people who understand me at every level. He wants the people who work around him daily to be able to do anything he can do, and they can do it better. He wants them to know how everything works and have the power to make it go, and make a lot of decisions. Professor Q noted that delegation is part of his management style. He says “he delegates it all. The key to delegation is to hand over the arena.
Here's the key to the arena now go make a show in there and do what you need to do.”

When delegating, he recommends work associates come back to him “to grease the skids or to handle the difficult questions or when things get tough, if they need more resources, or when something is wrong. But he believes you can’t parcel delegation and say okay I am going to let you make the critical decision now and not that one, but I’ll let you make that one. You hand them the thing and say that this is your domain. He believes the people he has worked with “over the last 30 years have responded to that phenomenally well.”

Professor Q stated “I pride myself on the fact that apart from undergraduate classes which I do teach, I have not taught a single class that I ever took. At the 600, 700, 800 level, those are all classes I made up or they are just things that did not used to be formal topics. So the field moves sufficiently quickly that you simply have to capture stuff and package it. Professor Q is committed to staying at the cutting edge and reinventing himself as he needs to, but finds that it is utterly exhausting. He stated, “I am constantly being forced to know things I don’t want to know in just order to survive.”

Professor Q noted that for many years he was a physicist working on control fusion, and then moved into microelectronics and now almost completely abandoned microelectronics in favor of biological applications. He suggested that real research is when you do not know what comes next. He is at the point where he is not sure what area he will be in next. Professor Q indicated that he tells his students that they “will have to reinvent themselves roughly, not overhaul completely, but roughly reinvent every five years to develop a broad skill set.” He noted the same thing that he threatens his students with has happened to him.
Disciplinary Context

Professor Q thinks science research is entrepreneurial in that you are breaking new ground. Science involves taking existing “infrastructural baggage and extending it; that in a sense is entrepreneurial.” He said, “it means pioneering and like all pioneers you pack up the wagon and you go, and what you put in the wagon are the things that belonged in the old town you just left and you have to go out and find a new intersection of two rivers or whatever suits you, valley or mountain peak and establish a new village there.” He says, “science is like that and business is like that to some extent.” Professor Q suggested some types of scientific areas that are highly entrepreneurial and technical areas are biophysics, communications technology, most nanotechnology, most of these sort of microscopic and nanoscopic objects, molecular machinery, and self-assembly.

Professor Q suggested that several trends are influencing his academic work. Globalization of knowledge in that “intellectual labor requires only a brain and a communication channel” thus creating greater intellectual competition requires him to work hard to add value to projects, and he suggested that is true for everybody. Also within science he suggested there has been a shift from arms and munitions into “God knows what.” Now he said, because of September 11, there is a shift back to arms and munitions. He said “it is more than just money that is moving. It is the interest and the impetuous.” He provided the example of a “large crowd suddenly looking to the northeast, there is a good chance that I would look to the northeast also...it is like federal funding...when the whole world looks in the direction...NSF, NIH, military science agencies, etc. look in...when they say the new thing is microwave pulse techniques a lot
of electrical engineers look in that direction even if it is not going to look at that
particular program or don’t want military money. They tend to look away from other
arenas for a while.” Another trend that Professor Q suggested affects his work is the
availability of brain power to pursue scientific careers. If there are many other attractive
alternatives “folks going off in other directions because it is easier to make a buck
somewhere else, it is hard to keep our youngsters interested in research and that affects
the whole picture especially for an academic, because we thrive only to the extent that we
can attract students and young researchers to work our problems.”

Professor Q indicated that the most valued work products of his department and
disciplinary field are “high level publications in accredited journals.” Those publications
dominate with me and my peers as to whether what we are doing is satisfactory.” Among
the people he works with, written work such as a paper people will read five years from
now and read with interest, is still a valuable commodity. Professor Q suggested the next
best products are patents and direct application. “People tend to think of does what you
do solve a problem for industry, or does what you do lead to a new product”?

Professor Q indicated that he highly values entrepreneurial activity. He noted that
“if I create a youngster and he goes off and hires 50-60 people someday, I think I have
done a good thing. If, on the other hand, that person publishes three or four papers my
resume as a professor is embellished. It looks a lot better for me to have co-authored
those papers with that student. People think of me as better because of that than if I said
a student I once had runs a factory. Those things don’t go on a resume so it has to do
with what goes on the reward line of the professor.” Professor Q suggested that although
he valued other type of activity, he still valued peer-reviewed literature. He noted that although he valued entrepreneurial activity, he is still "part of the establishment."

The following tables (Tables 2-8) provide an overview of the working styles, organizational conditions, and disciplinary attributes that were reported by the seventeen study participants. The tables were organized by both topic areas and by individual cases grouped in broad knowledge areas. They were developed to facilitate analysis of individual cases, cases within broad knowledge areas, and cases across broad knowledge areas. Table 2 summarizes data obtained primarily from a Content Analysis of curriculum vitae. Table 3 provides a summary of individual working style attributes. Table 4 categorizes data concerning organizational conditions. Table 5 summarizes data pertaining to disciplinary attributes. Tables 6-8 reference data from the questionnaires that provided response options. All seven tables include data that relate in some way to influences upon working styles of study participants.
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<td>21</td>
<td>Tilted toward admin</td>
<td>Individual and corporate fund raising that earns endowment income • NEH challenge grants that have resulted in approx. $3 million to institution</td>
</tr>
<tr>
<td>B</td>
<td>MC</td>
<td>Professor (Named) Former Dept. Chair</td>
<td>14</td>
<td>Balanced</td>
<td>Foundation grants • Approx. external 16 listed for study inst. • Internal grants also</td>
</tr>
<tr>
<td>C</td>
<td>LC</td>
<td>Professor (Named) Former Undergrad. Dean</td>
<td>33</td>
<td>Balanced</td>
<td>Fulbrights • Internal grants • Cobbles things together • Grant records indicate approx. 300,000 since 1991</td>
</tr>
<tr>
<td>D</td>
<td>LC</td>
<td>Professor, Center Director</td>
<td>29</td>
<td>Tilted toward research</td>
<td>Numerous DOL grants • Other external grants • Fund raising for program • Client funding • Consulting • Grant records indicate approx. $1.1 million since 1990</td>
</tr>
<tr>
<td>E</td>
<td>LC</td>
<td>Professor (Named)</td>
<td>34</td>
<td>Tilted toward research, disciplinary service</td>
<td>Indicated consulting and honorariums • Amount for funding not listed on C.V. or in internal grant publication information</td>
</tr>
<tr>
<td>F</td>
<td>MC</td>
<td>Center Director/Not Tenure Track</td>
<td>13</td>
<td>Heavily tilted toward service — 90 percent</td>
<td>500 grants and contracts awarded by federal, agencies, and other organizations (PI or Co-PI) • Records indicate approx. $13 million since 1991</td>
</tr>
<tr>
<td>G</td>
<td>EC</td>
<td>Associate Professor (Named)</td>
<td>9</td>
<td>Balanced, some tilt toward research</td>
<td>Federal grants • Has received NSF grant</td>
</tr>
<tr>
<td>H</td>
<td>MC</td>
<td>Dean Professor</td>
<td>3</td>
<td>Administrative role, but balance also noted</td>
<td>Fund raising important role</td>
</tr>
</tbody>
</table>

Table notes:
- A-H: Social Sciences
- I-L: Arts and Humanities
- M-Q: Natural Sciences
- Funding totals based on estimates of best information available from C.V. and institution supplied grant records. Estimated totals not available for some professors.
- EC: Pre-tenure to five years post-tenure
- MC: Six to twenty years post-tenure or non-tenure track
- LC: More than twenty years post-tenure
### Table 2: Curriculum Vitae Content Analysis: Part 1 (Continued)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Career Stage</th>
<th>Title</th>
<th>Years at Inst</th>
<th>Teaching, Research, Service, Admin.</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>MC</td>
<td>Associate Professor</td>
<td>9</td>
<td>Not reported directly, but probably balanced</td>
<td>Fulbright, NEH summer grant, Internal grants</td>
</tr>
<tr>
<td>J</td>
<td>MC</td>
<td>Professor, Dept. Chair (Named)</td>
<td>22</td>
<td>Tilted to teaching during academic year</td>
<td>Internal grants, Book subsidies, Grants-in-aid/Fellowships from professional societies and government agencies, Several grants listed in grants records totaling approximately 58,000 (not comprehensive)</td>
</tr>
<tr>
<td>K</td>
<td>MC</td>
<td>Associate Professor, Associate Dean of Center</td>
<td>9</td>
<td>Tilted to service in current admin. role</td>
<td>External grants from multiple sources, Internal grants, Estimated 200,000 in funding, Works with large donor funded projects</td>
</tr>
<tr>
<td>L</td>
<td>EC</td>
<td>Professor (Named)</td>
<td>20</td>
<td>Tilted to teaching when in teaching semesters, Frequently on academic leave for research</td>
<td>Guggenheim, NEH</td>
</tr>
<tr>
<td>M</td>
<td>MC</td>
<td>Professor</td>
<td>18</td>
<td>Balanced, but some tilt to teaching and research</td>
<td>Various federal sources such as Dept. of Energy, Fed. Laboratories, U.S. Air Force, Some industry funding, Internal grants</td>
</tr>
<tr>
<td>N</td>
<td>LC</td>
<td>Professor</td>
<td>32</td>
<td>Current role tilted to administration and research (about 50 percent each)</td>
<td>On-going federal research support, DOE since 1988, NSF for 12 years prior, Grants records indicate approx. $1.8 million since 1990</td>
</tr>
<tr>
<td>O</td>
<td>EC</td>
<td>Assistant Professor</td>
<td>4</td>
<td>Tilted to research (about 50 percent)</td>
<td>Grants records indicated approx. $1 million since 1999, Above total prior to recent $1.5 million grant</td>
</tr>
<tr>
<td>P</td>
<td>MC</td>
<td>Associate Professor</td>
<td>9</td>
<td>Tilted to teaching and research (inter-connected in graduate program)</td>
<td>Approx. $5 million</td>
</tr>
<tr>
<td>Q</td>
<td>MC</td>
<td>Professor Center Director (Named)</td>
<td>10</td>
<td>Tilted to research</td>
<td>Federal research support from numerous sources, Grant Records indicate approximately $8 million</td>
</tr>
</tbody>
</table>

**Table notes:**
- A-H: Social Sciences
- I-L: Arts and Humanities
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- Funding totals based on estimated on best information available from C.V. and institution supplied grant records.
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- MC: Six to twenty years post-tenure or non-tenure track
- LC: More than twenty years post-tenure

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Table 2: Curriculum Vitae Content Analysis: Part 2

<table>
<thead>
<tr>
<th>Cases</th>
<th>Career Stage</th>
<th>Title</th>
<th>Years at Inst.</th>
<th>Publications &amp; Other Work Products</th>
<th>Average Pub. Per Year</th>
<th>Estimated Number of Presentations</th>
</tr>
</thead>
</table>
| A     | MC           | Associate Professor, Center Director | 21 | • Extensive program development and supervision  
                     • 4 journal articles  
                     • 1 unrefereed article  
                     • Edited volume  
                     • Book reviews and review essays  
                     • Extensive governance  
                     (decision to emphasize program development over publishing) | L | • 10 listed under category of scholarly papers, talks, proceedings  
                     • Seminars also noted |
| B     | MC           | Professor (Named) Former Dept. Chair | 14 | • 38 periodicals or book chapters  
                     • 1 book  
                     • 7 edited volumes | H | • 28 invited scholarly papers/invited talks  
                     • 34 papers presented in scholarly meetings |
| C     | LC           | Professor (Named) Former Undergrad Dean | 33 | | | |
| D     | LC           | Professor, Center Director | 29 | • 7 journal articles/book chapters 3 edited volumes  
                     • 28 reports for government/non government organizations listed  
                     • Consulting | H | • 22 listed for invited talks and papers |
| E     | LC           | Professor (Named) | 34 | • 10 books;  
                     • 11 monographs  
                     • 9 book chapters  
                     • 23 journal articles  
                     • Approx. 400 articles in major newspapers  
                     • 125 articles in encyclopedias and yearbooks | H | • 33 invited talks and papers  
                     • Approx. 400 lectures to govt. organizations |

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- EC: Pre-tenure to five years post-tenure  
- MC: Six to twenty years post-tenure or non-tenure track  
- LC: More than twenty years post-tenure  
- Average publications per year decision rule:  
  • Low (L): less than one publication per year at study institution (Some professor's publication counts not sorted by institutions.  
  • Medium (M): approximately 1 publication per year  
  • High (H): More than one publication per year  
- Researcher recognizes different emphasis professor's place on publication work, and on disciplinary productivity norms. Publication averages were just one factor considered in examining faculty work products. For most professors, publication numbers based on information provided in November-February, 2001.  
- ___ - Information not provided.
Table 2: Curriculum Vitae Content Analysis: Part 2 (Continued)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Career Stage</th>
<th>Title</th>
<th>Years at Inst.</th>
<th>Publications &amp; Other Work Products</th>
<th>Average Pub. Per Year</th>
<th>Estimated Number of Presentations</th>
</tr>
</thead>
</table>
| F     | MC           | Center Director/Not Tenure Track | 13 | • Approx. 27 articles and chapters while at study institution (do not know if refereed or not)  
|       |              |       |                | • 1 book                           | H                     | • 66 principal presented papers  |
| G     | EC           | Associate Professor (Named)      | 9  | More than 60 publications (do not know totals since at current institution) |                      | References to extensive experience |
| H     | MC           | Dean Professor                   | 3  | More than 60 publications (do not know totals since at current institution) |                      | References to extensive experience |
| I     | MC           | Associate Professor              | 9  | • 8 periodicals and/or chapters in books  
|       |              |       |                | • 1 Edited volume  
|       |              |       |                | • Performances  
|       |              |       |                | • Production of CD | M                     | • 37 invited scholarly papers and talks  
|       |              |       |                | • Fieldwork and consulting including presentations |
| J     | MC           | Professor, Dept. Chair (Named)   | 22 | • 8 books  
|       |              |       |                | • 44 articles  
|       |              |       |                | • 23 reviews (not comprehensive) | H                     |                                            |
| K     | MC           | Associate Professor, Associate Dean of Center | 9  | • 1 book in preparation  
|       |              |       |                | • 1 edited volume  
|       |              |       |                | • approx. 10 refereed articles chapters in books, conference proceedings  
|       |              |       |                | • 13 refereed scholarly presentations | H                     | • Approximately 16 invited presentations  |
| L     | EC           | Professor (Named)                | 20 | • 10 books  
|       |              |       |                | • 3 edited volumes  
|       |              |       |                | • 28 articles (not noted if all peer reviewed) | H                     |                                            |

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- LC: More than twenty years post-tenure
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  - Medium (M): approximately 1 publication per year
  - High (H): more than one publication per year
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- Information not provided.
Table 2: Curriculum Vitae Content Analysis: Part 2 (Continued)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Career Stage</th>
<th>Title</th>
<th>Years at Inst.</th>
<th>Publications &amp; Other Work Products</th>
<th>Average Pub. Per Year</th>
<th>Estimated Number of Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>MC</td>
<td>Professor</td>
<td>18</td>
<td>- 32 Refereed journal publications</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 13 conference proceedings</td>
<td></td>
<td>- 28 invited scholarly papers, invited talks, colloquia, seminars</td>
</tr>
<tr>
<td>N</td>
<td>LC</td>
<td>Professor</td>
<td>32</td>
<td>- 70 publications in journals</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 51 published papers in conference proceedings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 1 book</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Contributions to books</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Major reports and proposals</td>
<td></td>
<td>- More than 100 unpublished invited talks, and unpublished seminars and colloquia</td>
</tr>
<tr>
<td>O</td>
<td>EC</td>
<td>Assistant Professor</td>
<td>4</td>
<td>- 7 (5 refereed and 2 unrefereed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 2 additional at another institution</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Two additional refereed articles submitted</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 1 patent disclosure filed</td>
<td></td>
<td>- 10 invited talks, 20 contributed talks</td>
</tr>
<tr>
<td>P</td>
<td>MC</td>
<td>Associate Professor</td>
<td>9</td>
<td>- 49 listed on professor's recent publications list</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>MC</td>
<td>Professor Center Director (Named)</td>
<td>10</td>
<td>- Approx. 150 refereed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- 50 more non-refereed (not all while at current institution)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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- ____ - Information not provided.
### Table 3: Working Styles

<table>
<thead>
<tr>
<th>Cases</th>
<th>Working Style Attributes</th>
<th>Entrepreneurial Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>- Consensus builder</td>
<td>- Multi-faceted center development</td>
</tr>
<tr>
<td></td>
<td>- Facilitates relationships</td>
<td>- Incubator of programs</td>
</tr>
<tr>
<td></td>
<td>- Early morning work</td>
<td>- De-emphasized publishing to pursue program development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Admin. role</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Resource development</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>- Contingency plans</td>
<td>- Innovative course</td>
</tr>
<tr>
<td></td>
<td>- Involves stakeholders</td>
<td>- Consulting</td>
</tr>
<tr>
<td></td>
<td>- Networks important</td>
<td>- Disciplinary service</td>
</tr>
<tr>
<td></td>
<td>- Idea time in morning, writing and editing at night</td>
<td>- Role in growth of program</td>
</tr>
<tr>
<td></td>
<td>- Walks for inspiration</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>- Substantial preparation for lectures</td>
<td>- Innovative service component to course</td>
</tr>
<tr>
<td></td>
<td>- Lecture as performance</td>
<td>- City council</td>
</tr>
<tr>
<td></td>
<td>- Influencing groups important</td>
<td>- Administrative roles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Institutional service</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>- Problem solver</td>
<td>- Center development</td>
</tr>
<tr>
<td></td>
<td>- 48 hour rule -- don't overreact but solve quickly</td>
<td>- Emphasis on client service and impact on public policy</td>
</tr>
<tr>
<td></td>
<td>- Entrepreneurial</td>
<td>- Resource Development</td>
</tr>
<tr>
<td></td>
<td>- Networking for projects</td>
<td></td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>- Direct efficient style</td>
<td>- Productive in field</td>
</tr>
<tr>
<td></td>
<td>- Weekend work important</td>
<td>- Role as legislator</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>- Planning important</td>
<td>- Non tenure track</td>
</tr>
<tr>
<td></td>
<td>- Focused all out during working hours</td>
<td>- Highly productive center with well-publicized work products</td>
</tr>
<tr>
<td></td>
<td>- In office early -- first hour sets stage for rest of day</td>
<td></td>
</tr>
<tr>
<td><strong>G</strong></td>
<td>- Expanding and intersecting circles of influence - - aware of working at different levels (e.g. institutional, local, national)</td>
<td>- Working in multiple areas</td>
</tr>
<tr>
<td></td>
<td>- Practices &quot;economics with a purpose&quot;</td>
<td>- Temporary assignment with DOL</td>
</tr>
<tr>
<td></td>
<td>- Relationship networks important</td>
<td>- Institutional service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Community roles including school board</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>- Hire good people</td>
<td>- Director of productive influential center</td>
</tr>
<tr>
<td></td>
<td>- Give them resources</td>
<td>- External Relations including media contact and fund raising</td>
</tr>
<tr>
<td></td>
<td>- Stay out of the way</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Offer to help when needed</td>
<td></td>
</tr>
</tbody>
</table>

**Table notes:**
- A-H: Social Sciences
- I-L: Arts and Humanities
- M-Q: Natural Sciences
Table 3: Working Styles (Continued)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Working Style Attributes</th>
<th>Entrepreneurial Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>■ Performance important</td>
<td>■ Active in performance</td>
</tr>
<tr>
<td></td>
<td>■ Missionary zeal for</td>
<td>■ Unique in department</td>
</tr>
<tr>
<td></td>
<td>specialty</td>
<td>with specialty</td>
</tr>
<tr>
<td></td>
<td>■ Research on edges (</td>
<td></td>
</tr>
<tr>
<td></td>
<td>during breaks, summer,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>deadlines)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Takes initiative and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>responsibility for extra</td>
<td></td>
</tr>
<tr>
<td></td>
<td>projects</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>■ Segments work time</td>
<td>■ Success in obtaining</td>
</tr>
<tr>
<td></td>
<td>■ Doesn't over-extend</td>
<td>grant support</td>
</tr>
<tr>
<td></td>
<td>research during</td>
<td>■ Productivity in</td>
</tr>
<tr>
<td></td>
<td>teaching semester</td>
<td>multiple areas</td>
</tr>
<tr>
<td></td>
<td>■ Overall, time for most</td>
<td>■ Productive research</td>
</tr>
<tr>
<td></td>
<td>components of academic</td>
<td>summers</td>
</tr>
<tr>
<td></td>
<td>life. Summer very</td>
<td></td>
</tr>
<tr>
<td></td>
<td>important for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>productivity</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>■ Relationship networks</td>
<td>■ Movement out of home</td>
</tr>
<tr>
<td></td>
<td>important</td>
<td>department to pursue</td>
</tr>
<tr>
<td></td>
<td>■ Sense of appreciation</td>
<td>development of</td>
</tr>
<tr>
<td></td>
<td>for position</td>
<td>programs</td>
</tr>
<tr>
<td></td>
<td>■ Passion for work and</td>
<td>■ Resource Development</td>
</tr>
<tr>
<td></td>
<td>making impact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Early morning and</td>
<td>■ External Relations</td>
</tr>
<tr>
<td></td>
<td>weekend work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>important</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Organized</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Needs to be out and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>about &quot;writing new</td>
<td></td>
</tr>
<tr>
<td></td>
<td>page instead of tending</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to routine functions</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>■ Time away from teaching</td>
<td>■ Success in obtaining</td>
</tr>
<tr>
<td></td>
<td>important for writing</td>
<td>grant support</td>
</tr>
<tr>
<td></td>
<td>and research</td>
<td>to enable time for</td>
</tr>
<tr>
<td></td>
<td>■ Writing cottage and</td>
<td>research and writing</td>
</tr>
<tr>
<td></td>
<td>summer house important</td>
<td>■ Maverick in</td>
</tr>
<tr>
<td></td>
<td>for scholarly</td>
<td>disciplinary area</td>
</tr>
<tr>
<td></td>
<td>productivity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Solitude important</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Writing becomes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>obsessive when in that</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mode</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>■ Explores a broad array</td>
<td>■ Center development</td>
</tr>
<tr>
<td></td>
<td>of topics</td>
<td>■ Sponsored research</td>
</tr>
<tr>
<td></td>
<td>■ Teaching students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>soft skills valuable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>for professionalism</td>
<td></td>
</tr>
<tr>
<td></td>
<td>important to him</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Two regular long-standing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>collaborations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Incubation important</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Creative ideas when</td>
<td></td>
</tr>
<tr>
<td></td>
<td>relaxing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Likes brokering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>relationships</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Groups like molecular</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bonds -- forming and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>reforming -- part of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>style</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>■ Very focused</td>
<td>■ Role in bringing</td>
</tr>
<tr>
<td></td>
<td>■ One project dominant</td>
<td>federal lab to</td>
</tr>
<tr>
<td></td>
<td>-- but working on</td>
<td>region</td>
</tr>
<tr>
<td></td>
<td>others in a limited</td>
<td>■ Sponsored research</td>
</tr>
<tr>
<td></td>
<td>way</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Makes himself</td>
<td></td>
</tr>
<tr>
<td></td>
<td>indispensable to some</td>
<td></td>
</tr>
<tr>
<td></td>
<td>groups</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ High standards for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>papers -- maybe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sometimes to a fault</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Early riser. Sometimes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>wakes and works for a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>couple of hours</td>
<td></td>
</tr>
</tbody>
</table>

Table notes:
- A-H: Social Sciences
- I-L: Arts and Humanities
- M-Q: Natural Sciences

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Table 3: Working Styles (Continued)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Working Style Attributes</th>
<th>Entrepreneurial Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>■ Gregarious</td>
<td>■ Work with industry and federal support</td>
</tr>
<tr>
<td></td>
<td>■ Likes professional society work -- think that may be unusual for his pre-tenure career stage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Views his work as entrepreneurial</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>■ Employability of students important Relationship with industry important Works with multiple students and other collaborators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Work with industry and federal support</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Patent activity</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>■ Prefers to create organizations that are flexible and mobile Combine elements of individualism and ruggedness with sense of family and community Balance between order and chaos. People call him a renegade Constantly learning new material and exploring new areas Pick-up teams important part of working style Hideaway offices important Delegates effectively Lives life outside of lines Doesn't like unnecessary bureaucratic obstacles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Work on multiple fronts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Center development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Sponsored research</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Industrial relations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Exploring different areas</td>
<td></td>
</tr>
</tbody>
</table>

Table notes:
- A-H: Social Sciences
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- M-Q: Natural Sciences
Table 4: Organizational Conditions

<table>
<thead>
<tr>
<th>Cases</th>
<th>Some Form of Released Time Important</th>
<th>Consensus-Building or Shared Decision-Making Important</th>
<th>Facilities or Access to Equipment Problems</th>
<th>Lack of Support Staff a Problem</th>
<th>Evaluation and/or Assessment Topic of Concern</th>
<th>Internal Resources Important</th>
<th>References to Autonomy or Independence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>—</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>—</td>
</tr>
<tr>
<td>D</td>
<td>Yes</td>
<td>Yes</td>
<td>Some at one time. Not currently.</td>
<td>Yes</td>
<td>_</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>E</td>
<td>—</td>
<td>—</td>
<td>No</td>
<td>No</td>
<td>_</td>
<td>_</td>
<td>Yes</td>
</tr>
<tr>
<td>F</td>
<td>No</td>
<td>Planning important. Independence of Center important.</td>
<td>Yes</td>
<td>Mixed. Need operating support.</td>
<td>_</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>G</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>H</td>
<td>Yes, for faculty in general</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>_</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table notes:

A-H: Social Sciences
I-L: Arts and Humanities
M-Q: Natural Sciences

— -Not substantially discussed or researcher unclear on response
Table 4: Organizational Conditions (Continued)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Some Form of Released Time Important</th>
<th>Consensus-Building or Shared Decision-Making Important</th>
<th>Facilities or Access to Equipment Problems</th>
<th>Lack of Support Staff a Problem</th>
<th>Evaluation and/or Assessment Topic of Concern</th>
<th>Internal Resources Important</th>
<th>References to Autonomy or Independence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>___</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>J</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>K</td>
<td>Yes</td>
<td>Yes, but sometimes moves forward without a lot of input</td>
<td>Yes, but reported by another participant</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>L</td>
<td>Yes</td>
<td>___</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>M</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Mixed</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>N</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>O</td>
<td>___</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>P</td>
<td>___</td>
<td>___</td>
<td>Yes</td>
<td>No</td>
<td>__</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Q</td>
<td>Yes</td>
<td>Yes</td>
<td>___</td>
<td>___</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table notes:

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- M-Q: Natural Sciences
- ___ - Not discussed or researcher unclear on response
Table 5: Disciplinary Context

<table>
<thead>
<tr>
<th>Cases</th>
<th>Disciplinary Field</th>
<th>Theoretical or Applied Approaches</th>
<th>Prof. Society Activity</th>
<th>Inter-Disciplinary Approach</th>
<th>Work Product Emphasis on Peer Reviewed Publications</th>
<th>General View of Expectation to be Entrepreneurial (Dept., Inst., or Discip.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Government</td>
<td>Applied, Some theoretical</td>
<td>Yes</td>
<td>Yes</td>
<td>No, but has a publishing record</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>Anthropology</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Mixed</td>
</tr>
<tr>
<td>C</td>
<td>Economics</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Mixed</td>
</tr>
<tr>
<td>D</td>
<td>Economics</td>
<td>Both, heavy applied</td>
<td>Yes</td>
<td>Yes, for policy studies</td>
<td>Yes, but also emphasis on client reports</td>
<td>Mixed</td>
</tr>
<tr>
<td>E</td>
<td>Government</td>
<td>Both</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Archaeology</td>
<td>Both, heavy applied</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, but not required, extensive publishing record, heavy emphasis client reports</td>
<td>Yes</td>
</tr>
<tr>
<td>G</td>
<td>Economics</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Mixed</td>
</tr>
<tr>
<td>H</td>
<td>International</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table notes:

- A-H: Social Sciences
- I-L: Arts and Humanities
- M-Q: Natural Sciences
- Interdisciplinary approach: Distinctions are not made here regarding whether interdisciplinary work involved professors utilizing multiple disciplines to inform a primarily single disciplinary approach or if also working on multidisciplinary teams.
- ___ - Not discussed or researcher unclear on response
Table 5: Disciplinary Context (Continued)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Disciplinary Field</th>
<th>Theoretical or Applied Approaches</th>
<th>Prof. Society Activity</th>
<th>Inter-Disciplinary Approach</th>
<th>Work Product Emphasis on Peer Reviewed Publications</th>
<th>General View of Expectation to be Entrepreneurial (Dept., Inst., or Discip.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Music</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>J</td>
<td>Classics</td>
<td>Both, heavy theoretical</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>K</td>
<td>Modern Languages</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No to discipline, yes to temporary role</td>
</tr>
<tr>
<td>L</td>
<td>Linguistics</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>M</td>
<td>Physics</td>
<td>Theoretical, some applied</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>N</td>
<td>Physics</td>
<td>Theoretical</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>O</td>
<td>Applied Science</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>P</td>
<td>Applied Science</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, also industry relations, licensing</td>
<td>Yes</td>
</tr>
<tr>
<td>Q</td>
<td>Physics Chemistry/Applied Science</td>
<td>Both</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes, but also interested in less traditional work: licensing, patents, start-ups</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table notes:

- A-H: Social Sciences
- I-L: Arts and Humanities
- M-Q: Natural Sciences
- Interdisciplinary approach: Distinctions are not made here regarding whether interdisciplinary work involved professors utilizing multiple disciplines to inform a primarily single disciplinary approach or if also working on multidisciplinary teams.
- ___ - Not discussed or researcher unclear on response
Table 6: Questionnaire Data: Working Condition Question

<table>
<thead>
<tr>
<th>Working Condition</th>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Neutral (3)</th>
<th>Somewhat Disagree (2)</th>
<th>Strongly Disagree (1)</th>
<th>Un-decided (0)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible enforcement of policies and procedures</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td>3.86</td>
</tr>
<tr>
<td>Organizational structures with limited bureaucratic constraints</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Freedom and autonomy concerning work processes</td>
<td>2</td>
<td>9</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Encouragement and sufficient time to pursue intrinsically interesting tasks</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>High degree of challenging work with adequate levels of support</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Manageable teaching load</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>Positive departmental morale</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>Positive institutional morale</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>Positive disciplinary morale</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3.4</td>
</tr>
<tr>
<td>Minimal negative departmental politics</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>Minimal negative institutional politics</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>Minimal negative disciplinary politics</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>Overall high quality of facilities</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>3.4</td>
</tr>
<tr>
<td>Encouragement of interdisciplinary work</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
<td>3.3</td>
</tr>
<tr>
<td>Adequate student and support staff resources</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td></td>
<td>2.8</td>
</tr>
<tr>
<td>Climate that highly values entrepreneurial behaviors</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td>3.3</td>
</tr>
</tbody>
</table>

Table notes:

- N: Total number of questionnaire responses.
- Mean calculated by multiplying numbers in individual category and dividing by the total number of responses for category.
- For question concerning high degree of challenging work with adequate support staff several participants made notations suggesting “yes” to high degree of challenging work, but “no” to adequate support staff. Mixed response caused N for this question to be greater than total number responding to question.
- Six participants responded to questions that did not include same type of response options. Those responses were converted to “agree” or “somewhat disagree” where appropriate.
Table 6: Questionnaire Data: Working Condition Question (Continued)  

<table>
<thead>
<tr>
<th>Working Condition</th>
<th>Strongly Agree (5)</th>
<th>Agree (4)</th>
<th>Neutral (3)</th>
<th>Somewhat Disagree (2)</th>
<th>Strongly Disagree (1)</th>
<th>Un-decided (0)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding for projects</td>
<td>5 1 3 1 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Support from departmental staff and/or central administrators in obtaining resources</td>
<td>1 3 3 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.5</td>
</tr>
<tr>
<td>Financial rewards for entrepreneurial behaviors</td>
<td>3 3 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Other rewards for entrepreneurial behaviors</td>
<td>5 1 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.4</td>
</tr>
<tr>
<td>Supportive leadership (dean and/or department chair)</td>
<td>1 7 2</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>Released time for research or other non-teaching activities</td>
<td>1 7</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>Availability of sabbatical opportunities</td>
<td>2 6</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>Overall fair intellectual property policies that encourage entrepreneurial behaviors</td>
<td>2 3 1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>Overall fair conflict of interest policies that encourage entrepreneurial behaviors</td>
<td>2 2</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>4.2</td>
</tr>
</tbody>
</table>

Table notes:

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- Mean calculated by multiplying numbers in individual category and dividing by the total number of responses for category.
- For question concerning high degree of challenging work with adequate support staff several participants made notations suggesting "yes" to high degree of challenging work, but "no" to adequate support staff. Mixed response caused N for this question to be greater than total number responding to question.
- Six participants responded to questions that did not include same type of response options. Those responses were converted to "agree" or "somewhat disagree" where appropriate.
Table 7: Questionnaire Data: Selected Entrepreneurial Activities  N=12

<table>
<thead>
<tr>
<th>Selected Entrepreneurial Activities</th>
<th>Frequently</th>
<th>Occasionally</th>
<th>At Least One Occasion</th>
<th>Never</th>
<th>Undecided</th>
<th>Yes, Intensity Not Noted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting and operating a center, institute or other type of organizational unit</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Active engagement in obtaining resources for work through grants and contracts</td>
<td>5</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Early adoption of new instructional technologies</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Development of novel instructional technologies</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General entrepreneurial working style</td>
<td>4</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic productivity that is above departmental norms</td>
<td>2</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic productivity that is above institutional norms</td>
<td>2</td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic productivity that is above disciplinary norms</td>
<td>3</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation in interdisciplinary projects</td>
<td>4</td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>Earning royalty income</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Contracting with or licensing technology to business, industry and other organizations</td>
<td></td>
<td></td>
<td>1</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Obtaining patents and trademarks</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Earning consulting income</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Obtaining copyright protection on intellectual property</td>
<td>1</td>
<td></td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>Establishing and operating a business</td>
<td>1</td>
<td></td>
<td></td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>WORKING STYLE PREFERENCES</td>
<td>NUMBER</td>
<td></td>
<td></td>
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<tr>
<td>-------------------------------------------------</td>
<td>--------</td>
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<tr>
<td><strong>Working time:</strong></td>
<td></td>
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<tr>
<td>Early morning hours</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Standard working hours</td>
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<tr>
<td>Evening hours</td>
<td>5</td>
<td></td>
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<tr>
<td>Very late night/early morning hours</td>
<td>3</td>
<td></td>
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<tr>
<td>Depends on type of project</td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td><strong>Place of work:</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home office</td>
<td>6</td>
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<tr>
<td>Field project location</td>
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<td></td>
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<tr>
<td>Studio</td>
<td></td>
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<tr>
<td>Laboratory</td>
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<tr>
<td>Depends on type of project</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Routine or flexible working style:</strong></td>
<td></td>
<td></td>
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<tr>
<td>Well-established structures and routines</td>
<td>3</td>
<td></td>
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<tr>
<td>Flexible or adaptable approach that helps me respond to changing priorities</td>
<td>6</td>
<td></td>
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<tr>
<td>Depends on nature of project or activity</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td><strong>Collaboration or solitary work:</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Nature of discipline requires substantial solitary work</td>
<td>2</td>
<td></td>
<td></td>
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<tr>
<td>Nature of discipline requires extensive collaborative work</td>
<td>2</td>
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<tr>
<td>Prefer a working style that combines collaborative projects and solitary work</td>
<td>7</td>
<td></td>
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<tr>
<td>Depends on nature of project or activity</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Pace and intensity of work:</strong></td>
<td></td>
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<tr>
<td>Prefer to focus on a limited number of projects</td>
<td>3</td>
<td></td>
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<tr>
<td>Comfortable juggling multiple projects and activities simultaneously</td>
<td>5</td>
<td></td>
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<tr>
<td>Prefer a pace that allows for substantial time for reflection and project revision</td>
<td>2</td>
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<tr>
<td>Prefer a fast-paced environment requiring quick decisions</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>Deadlines serve as a motivating factor and enhance performance</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>Prefer to set own time schedules for projects</td>
<td>2</td>
<td></td>
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</tbody>
</table>
CHAPTER FIVE: ANALYSIS OF EMERGING THEMES

Introduction

The case summaries and Tables 2-8 presented in Chapter Four represent the results of the data analysis and data reduction procedures for the study. Chapter Five presents evidence of themes that emerged from analysis of individual case data and provides an analysis across cases. The themes are grouped into the categories of study participant working styles, organizational conditions in which the professors work, and the disciplinary context for the work of study professors. Table 9 presented at the end of this chapter summarizes themes across cases.

The three broad topic areas, working styles, organizational conditions, and disciplinary context reflect the logical categorization of data that were collected. The organizational structure, however, for the interview protocol, and questionnaire was guided by the research questions, and conceptual framework, discussed in Chapter Two. The four research questions were structured to examine working styles of nominated entrepreneurs, the conditions in which they work, and how the conditions and working styles may differ by broad knowledge areas. The guiding research questions of the study will also be discussed in this chapter in relation to the cross case analysis of emerging themes.

The cross case data analysis process involved organizing and re-organizing data from the individual case summaries, questionnaire, and curriculum vitae data into broad categories, and subcategories. Procedures associated with case study qualitative research such as categorical aggregation, “chunking”, and sorting of data were utilized. Preliminary matrices were developed to facilitate the categorization process. The data
reduction process was continuous from the point of initial data collection through the process of case writing, general cross case analysis, development of preliminary matrices, drafting of preliminary emerging themes, development of data tables, and refinement of emerging themes (Yin, 1994).

Some views or observations made by study participants were useful in illuminating influences upon entrepreneurial behaviors, even if those observations were made by only one or two of the study participants. Precise statements of conclusions from data were challenging to make, given the qualitative nature of the data, and numbers of participants represented in the different knowledge areas. Therefore, conclusions are described as themes supported by statements of participants that fit within broad categories. Styles could vary by project, over the course of their career or depending on their current workload. Responses to questions needed to be viewed in the context of the time and place in which the professors were operating. Therefore, simple tabulation of most data points for the information was not practical due to the wide variety of depth and type of responses obtained. Quantification of information was hampered by the fact that all participants did not return a questionnaire, a partial purpose of which was to facilitate categorization of responses. Notwithstanding the limitations of the data obtained and subsequent analysis, several substantive themes emerged.

Working Style Themes

Examining attributes of the working styles of study professors was an important aspect of this study. All of the other major categories of this data analysis including disciplinary culture, departmental and institutional context, and work products are
influences upon study participants’ working styles. Understanding how professors, identified as entrepreneurial, interact or negotiate their work environments to accomplish their work is an important aspect of this study. The analysis of this working style section provides evidence to primarily answer Research Question 3.

Time and Place of Work

Preferences for place of work and time of work varied among study participants. The type of project influenced professors’ choice of work place. An office was expressed by some professors as a preference for routine activities such as grading exams, teaching, meeting with students, light editing, and institutional governance work. Routine work was often conducted during normal business hours in the professor’s offices. Rigorous scholarly activity such as writing often took place during non-routine hours. Very early in the morning, very late at night, on weekends, and during periods of release from teaching or summer months were frequently referenced as times for productive thinking and writing. Several professors indicated starting work as early as 4 or 5 a.m. At the other extreme, late at night in a quiet home environment was also suggested as important for scholarly productivity. A natural science professor indicated he often awakes in the middle of the night and works before going to bed again.

Fragmented time was referenced as a challenge to accomplishing work. Some sought to alleviate distractions by finding places that one natural science professor described as “hiddy holes.” At least one arts and humanities professor expressed a pragmatic attitude about the type and amount of research he can accomplish during the academic year when he has a full teaching load. He used the summer months for his time.
of most intensive research and writing. Another professor found focused think time in
the office for an hour or two at a time in which she asks staff not to disturb her, if
possible. Another used a writing cottage and a summer residence as places for
productive writing and reading. Home offices were an important location for writing
projects for many professors.

Professors’ workloads, interests and priorities varied from year to year, and
semester to semester, depending on their teaching loads, and availability of resources to
pursue research projects. Flexibility to follow their interests and emerging opportunities,
with the help of internal and external resources, was important. Flexibility concerning
what to work on and when, as well as where to work, within some recognized constraints,
was important to entrepreneurial arts and sciences faculty. Some types of projects
required structure, routines, and deadlines, whereas other projects had greater flexibility.
For some professors deadlines served as a motivator. Deadlines forced them to focus,
and moved their projects ahead. A natural science professor suggested that it is
“amazing” what he can accomplish when in that mode. A social scientist suggested that
his workload was so large that he tends to respond to deadlines. Research did not always
progress with specific deadlines. Often it required time-consuming dedication and
perseverance. Working on several projects simultaneously, with one project being
dominant, was an effective way several professors keep moving forward in several areas.
Other professors appeared to need to focus almost exclusively on bringing a major
research project to completion before beginning a new project.
Study professors appreciated structure and a disciplined approach that included maintaining routines. Professors built in time to use for projects that are the most pressing at the time, or for emerging opportunities. They were quick to rearrange their schedules when a new opportunity or problem arises. A natural science professor suggested that large projects need discipline over time, but opportunities arise requiring flexibility and a quick response. Another natural science professor indicated that he goes into a given work week with thirty hours of his schedule filled in and schedules the rest of his time as the week unfolds. Several professors noted that they handled some of their more routine work either during standard business hours and sometimes on teaching days when some available energy must be devoted to class preparation.

Although environmental conditions within study participants’ departments or the institution may not always provide exactly the conditions they need, study professors created conditions they needed. They expressed an awareness that if opportunities for one avenue or interest closed, they could go in another direction. Temporary assignments, grant projects, Fulbright awards and internal grants represented ways professors created the conditions they need for productivity and personal satisfaction. Study professors do not passively accept their working conditions. Their attitudes suggested they mold the conditions they needed to accomplish the goals they set for themselves.

*Incubation of Ideas*

The professors studied expressed an awareness of what type of work can be readily accomplished at different times of the year. Many professors indicated what
conditions they needed for different type of work. They expressed preferences of focused concentration on a given project, but may also be comfortable juggling multiple tasks simultaneously. Incubation of ideas was referenced as taking different forms. Consistent with the popular view that the academic life is not a 9-5 occupation, study professors expressed an awareness that insights to difficult work problems came at any time. For many study participants, their academic work engaged them constantly, especially during times when they were working on major projects.

Study professors indicated techniques they utilized to seek creative breakthroughs for their work. Persistence, and dedicating themselves to problems that others cannot or will not dedicate themselves to, patience, and understanding problems from multiple perspectives was important. Talking through research problems with colleagues, working through problems in laboratories, going to where research materials are available, and seeking solitude to think through and prepare research findings were referenced as important to advancing their work. Professors noted activities that were useful in thinking through topics or processing information, and brainstorming for fresh ideas. Walking around a lake, jogging, taking a shower, riding a bike to work, brainstorming with colleagues in meetings or informally, working in laboratories, relaxing, waking in the middle of the night, and talking with peers at professional conferences represented some of the activities that were referenced as valuable for that purpose.

Unique Qualities and Roles

Study professors saw themselves as unique in style and approach to their disciplinary work. One natural scientist said that he had lived his “entire life outside of
the lines.” His operating style was reflected in comments like “they call me a renegade.” An arts and humanities professor indicated he had a heavy emphasis upon research when professors in his department were not emphasizing research. He suggested that he knew what he wanted to do and went out and did it. Another arts and humanities professor reported that he did not share the predominant view concerning an approach to his discipline, and that he was somewhat of a maverick in his field.

Study professors indicated that their disciplinary field provided them with opportunities to work on projects with important purpose, not only in educating students, but also in advancing knowledge and in contributing to solutions to problems. Examples of applied aspects of their work included influencing public policy, developing programs that had a positive impact on students and faculty, contributing to cultural understanding, contributing to development of new and useful products, and “economics with a purpose.” Constantly probing for new knowledge was evident in the working styles of study professors. They consistently described their research interests as making a substantial contribution to their fields.

While professors, individually and collectively, reported that they believed their working styles included attributes that were very common or traditional for their academic department or within their discipline, they also suggested ways that their work or approach to their work could be interpreted as expressing an element of uniqueness. Focused disciplined research for extended periods of time, combined with an openness for new ideas, including multiple disciplinary approaches, was common among study participants. Study participants expressed attributes that reflected commitment to the
creative process by advancing knowledge in their disciplinary fields. A combination of “in the box” and “outside the box” thinking was evident in the working styles of many of them.

Study participants embraced new roles, often temporary, to accomplish a variety of purposes such as obtaining administrative experience, and pursuing research unencumbered by other responsibilities. They demonstrated behaviors such as working outside of their department, performing administrative roles or engaging in interdisciplinary work. Participants engaged in career enriching and varied activities, such as serving on city council and the local school board, and serving in the state legislature, conducting field studies worldwide, engaging in extensive foreign travel, serving in leadership capacities within their professional societies by active participation in editing journals, coordinating conferences, and making presentations. Many actively engaged in developing research centers and worked toward their success by obtaining resources for projects, conducting research, managing budgets and staff, securing space, and helping to plan facilities.

The study professors provided explanations of their work that could be described as entrepreneurial. One natural scientist suggested “the whole shebang is entrepreneurial. You have to make sure cash in equals cash out, and make sure products get out.” This same professor indicated that running a group is like running a small business. You can decide how large to grow the business. Professors saw their work as entrepreneurial because their work related to selling or promoting programs, incubation of ideas, developing ideas and organizing people. Creating organizations or centers from
"scratch", and comparing obtaining funding for projects to an initial public offering for a start-up firm, were additional examples of specific references to entrepreneurial behaviors.

Study participants maintained a sense of perspective about what they were able to accomplish, appearing optimistic, yet pragmatic. A social scientist's comment that she sets a goal of giving "150 percent effort and being satisfied with achieving 100 percent" reflects an attitude of striving for excellence, and a recognition that at times there may be limits to what may be accomplished. Working on multiple projects simultaneously, and pursuing different types of projects at different times depending on interest, other time commitments and availability of resources appeared to be a helpful way for professors to keep moving forward, and face obstacles, without becoming overly frustrated. Study participants had different opportunities to influence their schedules. Some study participants came from departments that required a larger teaching load.

Professors expressed an ability to secure the time and financial resources they needed to be productive. A social scientist expressed an attitude that is common to professors. She stated, "If a project is not funded, it is not fatal, I just move on to the next activity." An attitude of the ebb and flow of activities driven by the academic calendar and workloads combined with following emerging opportunities and changing of directions was important to many professors. If one resource dried up, they sought another resource. If one line of research proved unfruitful, they moved to another topic, often related, but sometimes substantially different or at least different enough to require an investment in learning.

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Many study participants were mid to late career. Their core specialty area may generally stay the same, but they have explored many topics. Professors reported satisfaction in broadening their research topic areas. Simultaneously, however, they noted a perception that the broader the research topics covered, the less depth that may be obtained. Some did not view their broadening explorations in those terms. They preferred to suggest that broadening topical areas was helpful in identifying connections in knowledge areas. The natural scientists acknowledged that their field had elements of stability, and thus changed slowly or progressed incrementally. Certain aspects of their fields were described as changing rapidly. Keeping up with changes in the field represented an important challenge. At least one natural science professor suggested a major feature of his career included constantly moving into different areas. Natural scientists commented that they encouraged students to develop a broad set of skills that would be transferable to other topic areas.

**Passion for Work**

Demonstrating intrinsic interest or passion for an aspect of their work was common among study participants. For example, one arts and humanities professors’ active involvement and commitment to her Middle East ensemble, while obviously representing a disciplinary function, seemed to reach beyond meeting of on-going responsibilities. As the only music professor whose emphasis was non-Western music, she suggested she had a “missionary zeal” for her subject. A natural science professor suggested that he tries to carve out some time to work on topics just because of the enjoyment. An economist suggested that economics with a purpose was important to
him. Another economist and public policy professor suggested how satisfying it has been for him to make an impact on public policy. The modern languages professor noted that making a contribution to advancing cultural understanding was very important to her. Certain activities had a unique quality or may have been pursued for intrinsic reasons included involvement as a state legislator, service as a city council member, and temporary assignments with organizations outside of the university.

**Social Knowledge**

In delineating their work styles, professors expressed human relations skills, or a term Blackburn and Lawrence (1995) used in their research, social knowledge. Participants reported support for shared departmental and institutional decision-making. Professors noted the importance of consensus-building in decision making, or at least providing opportunities for input into decision-making. They looked for ways to obtain internal resources, promote collegiality, involve disciplinary and/or institutional colleagues in discussions, and carry a share of institutional and disciplinary service load. Extensive networks of relationships, especially within their disciplinary field was an important attribute for most study participants. Forming networks and collaborating with professors was a useful strategy in obtaining resources from external sources that may expect collaborative research efforts. Developing networks within the institutional context was expressed as being important to several study participants, in part, as helpful in obtaining financial and other resources for program activities. Concerning establishment of networks, one economics professor viewed his work as expanding and intersecting circles. He suggested that he valued working with people and contributing in
multiple areas including departmental, institutional, community, disciplinary societies, and government agencies.

A natural scientist suggested that to influence the outcomes of group processes, he attempted to make himself indispensable to groups he wanted to influence, often volunteering to serve as group secretary. Study professors appeared to be willing to engage in conflict to make their views known, and to make decisions that do not make everyone satisfied. Some professors, however, appeared to pick their battles carefully, preferring not to alienate individuals with whom they may disagree. One social science professor indicated he sleeps on difficult problems. He tries to keep a level head when people are dissatisfied with him. He noted that sometimes problems will just go away, resolve themselves, or individuals with whom you were disagreeing may forget about the problem. Keeping a level head avoids unnecessary escalation of conflict. Another professor maintained it is not necessary to go through a mountain if you can go around. A social scientist suggested that she does not like to fight a battle that she cannot win. She makes contingency plans when she encounters obstacles.

Teaching

The study institution has a strong tradition of emphasis on teaching excellence, and therefore teaching was an important component of the work of many study professors. A high value for teaching and mentoring of students was evident from many study participants. Several professors considered their approach to teaching as part of their entrepreneurial working style. Statements were made suggesting early adoption of instructional technology or an innovative approach to teaching. There were references by
study participants, particularly by professors who teach graduate courses, of how teaching and research are interconnected. An arts and humanities professor, however, indicated that his involvement in a program that does not have a graduate school component, has given him time to pursue his own research interests. One professor discussed his teaching as a type of entrepreneurial activity, with the professor selling ideas to students. This same professor suggested that larger lecture classes require an aspect of orchestrating a multi-faceted performance. A social science professor had developed an anthropology class that utilized information technology to involve students from her home institution and an institution in Japan. A natural science professor suggested that identifying a steady stream of research projects for graduate students reflected a type of entrepreneurial activity. Preparation for professional employment of program graduates was a common theme among natural scientists.

Data concerning teaching were often focused on issues related to teaching such as the amount of time for classroom preparation, and workload issues involved with teaching, such as preparing for classes, grading assignments, and advising. An important topic of discussion for some professors concerned the positive impact that a lighter teaching load had on research productivity. Helping graduate students with their research agendas and use of innovative instructional technologies were additional topics referenced by study participants.

*Governance/Service to Institution Role*

Governance and institutional service responsibilities to the study institution were referenced by many study participants as central to their role. Statements varied among
study participants concerning the level of participation, as well as enthusiasm for engagement in these activities. One natural scientist suggested that academic values relating to some areas were so important to faculty members that they were willing to make the sacrifices and serve on committees to preserve those values. For some professors, governance and service-related functions represented a distraction from their priority work, especially research-related work. Some professors appeared to handle a felt obligation to governance by revolving in and out of governance/service-related activities. They may be active for a while and then inactive for a period of time. Some professors seemed to engage in governance-related activities during periods when they cannot engage in substantial research anyway, such as during a semester with a large teaching or administrative load.

Administrative Roles

Study participants reported current or past administrative roles. Administrative roles included an administrative role with a federal research laboratory, a dean of an international studies program, multiple directors of centers, director of an academic concentration within a department, department chairs, dean of research and graduate programs, and a special assistant to the president. Fourteen of the study participants reported serving in some administrative capacity at some point during their career. Seven of the eight social science professors referenced some administrative role, with the remaining professor not reporting on the topic. Four of the five natural scientists referenced some administrative role, and three of the four arts and humanities professors referenced performing such a role, at least on a temporary basis. Two of the arts and humanities professors who referenced an administrative role may have had a larger role...
than the third arts and humanities professor who has served as director of the academic undergraduate concentration.

Study participants’ administrative roles involved different levels of commitment. For some professors, it was currently their major responsibility, and for other professors it was done in addition to regular academic responsibilities. Arts and sciences professors noted administrative roles enabled them to have an impact on development of institutional programs. The roles provide opportunities to obtain a departmental or institution-wide perspective for some professors. Assumption of an administrative role also reflected a commitment to participating in institutional service. A general finding that was consistent, but not unanimous, in all three broad knowledge areas was the tendency for professors to revolve in and out of administrative roles.

**Center or Program Development**

Seven of the eight social scientists and four of five natural scientists referenced involvement in developing and/or managing a center, institute, or active involvement in developing an academic or other special program. The centers and special programs were sometimes affiliated with a department and at times either loosely affiliated with a department or an entity separate from a department. Many of the centers are part of an academic unit such as a department. Specific center development was less of a major activity for arts and humanities professors with only one professor making a special reference to activity of this type. Academic program development in some form, however, appeared to be an activity for all study participants including arts and humanities professors. Therefore, social scientists and natural scientists commonly
developed programs through departments and a formal center, whereas arts and humanities professors actively developed programs, but not necessarily through a center or institute.

Center development was seen as closely related to a business or general organizational context for entrepreneurship. Some of the center activities of professors included start-up of the center, and if not starting the center, assuming responsibility soon after the establishment of the center. Center activity involved recruitment and management of staff. Resource development, often through grants and contracts or fund raising from individuals, foundations, and corporations, was an important center activity. Budgeting, coordination of project flow, and promotion and marketing of the center represented additional center activities for study professors. Resources available for center activities, including staff size, varied and fluctuated.

Development of centers represented an important mechanism for incubation and development of new programs, and provided opportunities for professors to collaborate with disciplinary peers, and other individuals interested in their area of expertise. A social science-related center has played an important role in the incubation of programs at the university, some of which have spun off from the center and developed into separate centers, programs, or became affiliated with departments. Center activities included engaging faculty from different disciplinary perspectives in projects.

Center growth and development for both social sciences and natural sciences faculty was encouraged within their departments. However, comments were mixed
concerning whether or not the center activity was necessarily rewarded. A social scientist indicated that center development for some departments may be encouraged, but not necessarily rewarded unless center activity furthers traditional scholarly activity, such as publishing in refereed journals. The same social scientist suggested that center development may be encouraged as much by central administration as by departmental representatives. For one social scientist there was a perceived disincentive for faculty to consult through the center. Doing so would require that faculty do so at a lower monetary rate than their rate as an independent consultant.

*Traditional Academic Work Products*

Study participants provided insights concerning the emphasis they placed upon traditional academic functions of teaching, research, and service. Thirteen professors responded to the question concerning division of time. Eight indicated that they spend thirty percent or more time teaching. Seven professors spend thirty percent or more time on research, and two spend more than thirty percent of their time on service. Four study participants suggested that they spend more than thirty percent on other activities, such as center development. Responses to the question included clarifications such as “this was not a typical semester”, or percentages for teaching and research would not total one-hundred percent since teaching and research at the graduate level. Common traditional academic work products referenced by study participants included refereed journal articles, books, chapters in books, monographs, and published or unpublished papers presented to professional organizations.
All study participants had a history of publishing their research findings. The number and type of publications varied among participants. The researcher recognized that factors such as career stage, nature of discipline, emphasis placed upon submitting work for publication, and other time commitments would influence publication rates. Therefore, the researcher did not make counting publications an important part of data analysis, although data of this type is presented in the curriculum vitae content analysis table (Table 2) presented at the end of Chapter Four. One study participant did not have an expectation to publish in academic journals since he was not on a tenure-track. Ironically, this individual had an extensive record of publishing. A second study participant, a social science professor, de-emphasized traditional scholarly publishing to emphasize program development-related work products. The refereed journal article, for most study participants, in all three of the broad knowledge areas was valued substantially for purposes of tenure, promotion, and merit reviews. Books were also highly valued for most disciplines represented in the study.

Nontraditional Work Products

Study participants engaged in projects or assumed roles that may be less traditional than teaching, research, or service. It appeared, however, that many of those roles were complementary to the multiple roles of professors. Those activities were pursued regardless of how they fit into the faculty reward structure, although some of the roles were an integral part of their responsibilities.

Fitting the category of a position requiring work products that were somewhat non-traditional were the development of new programs and incubation of programs by
the professor who directs a center that serves students and faculty. The gravitation of a
social scientist toward undertaking projects and producing client reports, even though
they were not highly rewarded within his departmental reward structure, represented an
example of a professor who had developed a program and assumed responsibility for
projects that enabled him to make an impact on public policy, and developed a research
center, sometimes at the expense of peer-reviewed publications.

A topic raised by some professors concerned the topic of patents or copyrights.
Some professors, especially in the natural sciences, expressed experience with filing for a
patent or involvement in negotiating a license. All of the natural science professors had
some exposure to the area. Experience ranged from interest in the topic from an
administrative perspective, to considering filing a patent claim or negotiating a licensing
agreement, to active involvement in the area with direct experience filing a patent or
negotiating a licensing agreement.

A natural scientist noted that the effects of the institution’s intellectual property
policy changes are too recent to be felt by study participants. Key issues that have been
under discussion relate to how to share potential revenue from licensing agreements when
faculty used institutional resources, including equipment and time or other institutional
investments were made. This topic was of greatest interest for the applied scientists
participating in the study. Their work involved developing products with commercial
applications and included licensing agreements with representatives of business and
industry.
Resource Development

Obtaining resources to pursue a research agenda was a common theme among many study participants. Reliance on outside sources of funding or on internal sources of funding outside of routine operating funds varied by type of funding source, extent of involvement for individual professors, and in the broad areas considered. References to obtaining resources to engage in research or some other scholarly activity was present in all study participants. Research support of study participants came from sources such as federal agencies (e.g. National Science Foundation, the U.S. Department of Energy, the National Endowment for the Humanities, and Department of Defense). Research and other programs were also supported by contracts with private corporations and from private philanthropic foundations. Several social scientists noted that they also solicited funds from private donors, as did at least two of the arts and humanities professors. For two natural scientists, the outside funding source had been stable over a period of years.

Grant support required writing a time-consuming proposal or grant application. The natural scientists indicated that historically federal money had been available for their work, but that currently there was greater competition for awards. Two natural scientists indicated that federal funding in some areas was subject to shifts in priorities, which they indicated could be challenging when the shift was away from your topic of interest. At least two of the natural scientists, both physicists doing research that emphasizes theory over experimentation, had procured a longer-term commitment to their line of research. Study professors provided information that suggested that support levels varied substantially from smaller very project-specific grants of less than $5,000 to million dollar-plus projects to build programs, or conduct scientific research over a multi-
year period. In general, natural scientists served as principal investigators on projects of higher dollar values than the social scientists or arts and humanities although some of those projects involved multiple collaborators, including collaborators from other institutions. An exception to this was the work of a social scientist who directed a center. In addition, for work of some of the social scientists that involved fund raising from individuals, the researcher did not obtain estimated dollar values of funding.

Resourcefulness in procuring funds was common among study professors. A resourceful attitude was expressed in statements like “I can smell the money” by a social scientist. The same professor asked rhetorically “how can you be entrepreneurial without resources”? Another social science professor indicated that frequently he will “cobble things together” or used multiple sources of internal and external funding to accomplish a special project. Study professors expressed experience negotiating the grant writing process, indicating the importance of paying attention to funding source guidelines when preparing proposals. An acknowledgement of competitiveness in the funding process was evident. The importance of persistence in seeking funding, as well as seeking funding from a variety of sources was reflected in the comments of some study participants. Recognition that success in obtaining funding support can lead to further success was made by at least one arts and humanities professor. Collaboration, or as one natural science professor described it “pick up teams” of between three and a dozen individuals lasting in varying length of duration, was an effective way study professors pool intellectual resources, and other resources to strengthen their case for obtaining grant or contract support.
External sources of funding were used for many purposes. Funding in order to take a semester or year's leave from teaching responsibilities in order to conduct research, or work on a book or article represented one popular use of funding. This was especially relevant for at least two of the arts and humanities professors and a few of the social science professors. Natural scientist funding was used heavily to hire staff, including graduate students, to assist with research projects, and to purchase specialized equipment.

Participants expressed an acceptance of responsibility for “hustling” to obtain their own funding for research and other types of special projects. They also expressed frustration that there was not greater assistance available, either from internal sources of funding or additional support staff, to assist in pursuing funding opportunities. The one study participant, a social scientist, who is not tenure-track, indicated that his center is almost entirely dependent upon grants and contracts for its revenue. This individual indicated he wakes up every morning wondering how many proposals his center will need to produce. Other social scientists expressed the importance of obtaining grants, contracts or internal funding for special projects, although they may be less dependent upon revenue of that type. The comments of one natural scientist concerning expectations to seek external funding may reflect the views of other natural scientists in the study. That study participant suggested that there may be an expectation to seek external funding, but a recognition that, given the competitiveness of funding, there was not always an expectation to actually obtain external funding. For three social science professors, seeking external support was an important part of their job responsibilities.
An arts and humanities professor, currently working for a university-wide program, had resource development as one of her important responsibilities. All of the natural scientists appeared to be actively engaged in seeking external funding. Funding came from either relatively stable on-going sources for two professors or from multiple sources which was the case for three or four of the natural science professors. Several study participants suggested that their departments encouraged outside funding, but sometimes only to the extent that research undertaken with external funding also translated into published findings.

Study professors expressed different views concerning the labeling of their success in obtaining resources as entrepreneurial. Development of proposals seeking funding for a new initiative and implementing the program was compared to starting a new business by several study participants. Statements were made indicating success in this area represented an entrepreneurial working style, both in the process of getting the money and in managing the resulting projects. A social scientist compared grants and contracts related work, especially for a start-up project, to an initial public offering (IPO) for a business because there is an element of salesmanship and marketing in the external funding process. Generally, obtaining resources was related to being entrepreneurial in the context of starting something new, rather than in the context of profitability. Management of a grant-funded project involved coordination and management of resources, hiring and managing staff, and providing a product or service.

Professors within all broad knowledge areas suggested that developing resources reflected entrepreneurial activity. Comments to the contrary were also made, especially
from two natural science professors. They suggested that seeking external funding was not necessarily entrepreneurial since doing so has been a standard procedure for scientists for many years. They preferred to think of entrepreneurial activity as out of the ordinary or non-routine activity. Two professors outside of natural sciences, in expressing hesitation as to how their work was entrepreneurial, indicated that if a category that could fit a description of entrepreneurial must be chosen, then some form of resource development would be the most likely category. Some professors within the social sciences and within the arts and humanities felt they were substantially different from their departmental peers in the extent to which they pursued external sources of funding. Overall, there appeared to be a greater willingness to label resource development as entrepreneurial within areas where there was less general expectation concerning funding or tradition of seeking outside funding.

Organizational Conditions Themes

Understanding the organizational conditions of study professors and how they responded to departmental and general organizational situations was also an important aspect of the study. Study instrument questions were designed to solicit information to enhance the researcher's understanding of the study participants' interaction with their environments. The guiding research questions and conceptual framework for the study provided an overall organizational structure to understand issues associated with organizational conditions. Study professors provided information suggesting some of the academic values, general policies, governance, organizational culture, organizational climate, and infrastructure considerations that influenced the work they accomplished.
The need for autonomy, freedom, independence, shared governance, flexibility, and minimizing constraints were common themes stated by study participants. Those traditional academic values were expressed in some form or another by all study participants in responding to questions relating to organizational conditions. Study participants recognized that although there were some constraints upon their behaviors, there were also many aspects of their work environments that gave them freedom to pursue their interests and some level of flexibility in how they conducted their work. Several professors, in responding to the question concerning what they needed from academic administrators, suggested that they needed resources to accomplish that work, but that simultaneously they needed freedom or autonomy in how they accomplished their work. At least two professors bluntly stated that administrators needed to give them resources, and “get the hell out of the way.” Some study professors used softer language in indicating that resources and independence to move forward “unencumbered by administrative controls” were important, but communication with administrators, as well as recognition that work was appreciated, was also valuable.

Professors made statements suggesting that they highly valued autonomy, independence, flexibility, and freedom. They were willing to expend the effort through shared governance to preserve those values, and where possible, attempted to extend their level of autonomy. Common challenges to autonomy referenced by participants included layers of assessment that included activities relating to the rigor of some personnel reviews such as post-tenure review and annual reviews for merit increases. A few participants referenced post tenure reviews and annual merit reviews as time-consuming.
Course assessments were also described by one arts and humanities professor as time consuming and intrusive.

*Tensions Between Traditional Faculty Expectations and Entrepreneurship*

Most of the study participants' departmental affiliations appeared first to value traditional work products for the purposes of tenure review, promotion and merit increases. For some study participants, there was tension between departmental expectations concerning the rewarding of fairly traditional academic work, generally refereed journals, chapters in books, and books, and simultaneous encouragement from within their department or from central administration to engage in activities such as securing grants and contracts, developing centers, providing community service, writing reports for clients, participating in professional societies, and engagement in patent and contract work. Some of the latter are not necessarily unrewarded, and in many cases work such as grants, contracts, and patents may lead to publication or directly complement research that leads to publication. Nevertheless, some professors felt that participation in some of those activities may be disproportionally less rewarded than traditional academic scholarship. Faculty believed that they invested substantial time and energy in activities that are not highly rewarded. Some professors indicated an obligation to perform some activities, such as institutional service, or assume additional responsibilities that are not necessarily highly rewarded, but were still held to the same standards for traditional academic scholarship.

For some professors, the more entrepreneurial aspects of their working style, such as developing centers, teaching a highly innovative course, working in a temporary
administrative assignment, making substantial investments in time to change research topics, or aggressively pursuing a research agenda when not required, appeared to reflect intrinsic interest, a desire to seek new knowledge, professional pride, professional reputation, or faculty vitality. Some professors appeared aware of their academic legacy or long term impact that they had upon their field, their students and the institution.

Some professors made conscious decisions to emphasize one area over another, such as the professor who engaged in extensive policy studies on behalf of many different types of clients at the expense of a narrowly focused research agenda. One study participant suggested his center had been loosely affiliated with the institution for many years. This individual, while primarily serving clients in a service role, had produced many scholarly articles and books. His explanation of his center’s working relationship provided a valuable explanation of how loosely organizational units may be affiliated with other parts of the institution.

*Working Conditions Improvement*

Study participants suggested how their working conditions could be improved. They consistently emphasized areas such as additional support staff, larger budgets, fewer bureaucratic constraints, less movement toward greater assessment, less reporting, greater flexibility to pursue research, and a general recognition of the difficulties associated with meeting the multiple demands of their positions. Study participants referenced a desire to improve their facilities, or need for additional space. Criticisms of working conditions were counterbalanced with references to attributes of their working conditions that promoted their work, such as independence to pursue a research agenda,
flexibility concerning teaching loads or using grants/contracts or internal grants for released time to pursue research. Strong statements against bureaucratic constraints, at times were softened with an appreciation for some level of order and accountability.

The ebb and flow of academic responsibilities according to the academic calendar seemed important for study professors. There was a recognition and understanding of what could be accomplished at different times of the semester, or during the semester, versus time between semesters or during the summer months. Productivity, especially for research projects during the summer months, appeared to be important for several study participants. Many professors appeared to have been successful at times in working out arrangements within their departments, either through internal sources of funding, or through grant-related buyouts, to secure time away from routine duties to pursue research or other interests.

Another working condition some study professors would like to see improved is availability of funding to hire support staff to assist with projects. Some of the functions study participants sometimes have to perform due to lack of support staff included making copies, arranging travel, handling general logistical details, and coordinating events. Two professors also suggested that larger institutions also have staff to handle other business-related functions such as proposal preparation, and general coordination of projects. A few professors noted because of lean staffing, non-teaching activities that would be routinely delegated to support staff in more well-funded institutions, especially research institutions, were conducted by faculty. Some of those roles were filled by graduate or undergraduate students, but sometimes students were not available.
Professors indicated that performing support functions can be a distraction from accomplishing their academic work. However, a natural science professor suggested that the institution historically has had a lean support staff. By design, there were some faculty functions that professors would not want to delegate to an administrative staff.

Facilities

For many study participants, the physical plant of the institution did not appear to be a significant hindrance. Some physical plant issues may have been expressed as annoyances, but not as a large problem. Arts and humanities professors generally did not express dissatisfaction with their physical working conditions. An exception may be the arts and humanities professor who is currently working for a center. Her colleague, another study participant, suggested the center needed space to grow. Among the social scientists, one professor noted that her building was humid and flooded on occasion. She indicated some of her colleagues did not regularly work there due to health concerns. This same professor expressed a desire for a high technology classroom within her building.

The most direct observations concerning physical plant problems were made by natural scientists. Two of them suggested there were serious infrastructure issues for areas such as electrical power, even in a new science facility. At least one natural science professor also expressed frustration with individuals responsible for the physical plant, who, on occasion, have turned off heat or electricity during weekends or off-periods, and consequently put sensitive experiments at risk. A natural science professor suggested that all of the science buildings on campus are in need of renovation. Speaking
pragmatically, a natural scientist suggested that for some science equipment, the university cannot be expected to purchase all of what is needed. Therefore, it is important for natural scientists to cultivate relationships with individuals at other institutions who have access to the specialized equipment. The institution, however, should provide a basic infrastructure so professors can compete for external funding, noted a natural scientist. A natural scientist expressed his dissatisfaction over limited parking near his building by responding to a question concerning problems with the campus physical conditions by saying “parking, damn it.”

Notwithstanding statements participants made concerning inhibiting conditions in their work environments or how their working conditions could be improved, some faculty recognized that some of their complaints represented minor issues, and while not perfect, the conditions that promoted their entrepreneurial working style outweighed issues that inhibited it. Study professors were able to work around issues that concerned them. They expressed a willingness to raise issues with departmental and central administrators to seek solutions where practical. Some professors, who may have been more outspoken than others on issues such as lack of adequate staff support, inadequate space or general condition of facilities, and availability of funding for professional activities, pointed out that on some issues, administrators were constrained by limits to resources, economic conditions, legislative mandates, and funding streams from the state legislature.
Organizational Criticism Associated with Entrepreneurial Behavior

Study participants provided mixed responses concerning criticisms that were involved in pursuing some of their more entrepreneurial behaviors. Study participants were more likely to receive criticism when placing greater emphasis on activities that were not considered as highly valued within their department or within their disciplinary context. A social scientist suggested his promotion to full professor could have been delayed, in part, due to pursuit of entrepreneurial activities that may have been perceived at the expense of other more traditional scholarly activities. A few professors reported some criticism from departmental representatives when obtaining resources, especially for research-related projects, that enabled them to teach less, or made them less available for governance.

Facilitating Working Conditions

Positive attributes of affiliating with the study institution were described by study participants. The institution is a well-established and respected institution. Course loads for most, but not all study participants, were not overly burdensome. Formal and informal mechanisms enabled professors to obtain released time to pursue research and other scholarly projects. Office space and access to specialized equipment were provided to study participants. Opportunities for interaction with colleagues at the home institution, as well as in other organizational contexts, including professional societies, were widely available. The department or institution provided internal resources for some projects. Individual faculty actively used their knowledge and skills to obtain resources from external sources. Some study participants indicated that while
departmental and institutional representatives may not actively encourage certain entrepreneurial activity, they encouraged such activity by not preventing it.

Disciplinary Context Themes

Social science academic fields and disciplines represented in the study included three economists, one anthropologist, one archaeologist with a background in the related field of anthropology, two government/political scientists, and one international affairs expert. Fields and disciplines of the study’s natural scientists included two physicists, a physicist with a chemistry background and two applied scientists with backgrounds in engineering. Among arts and humanities professors, disciplines represented included one modern languages and cultural studies professor who appeared heavily influenced by anthropology, one Latin and Greek language and art professor, an ethnomusicologist, who is heavily influenced by music and anthropology, and one linguist.

Applied or Theoretical Emphasis

The fields and disciplines of the study participants, reflected differences in applied or theoretical approaches. Most professors who emphasized a theoretical approach also valued the practical applications of their work. Participants from those disciplinary fields that emphasized practical applications also appreciated the theoretical underpinnings of their work. Many of the disciplines represented in the study, particularly within the natural sciences and social sciences, emphasized quantitative research methodology. However, several participants emphasized qualitative approaches. Examples of qualitative approaches included fieldwork of the anthropologist and ethnomusicologist.
Regardless of the applied or theoretical approaches of study professors, it was very common across the knowledge areas for professors to express some form of social value for their work, either directly or indirectly. One economics professor suggested that while publishing aspects of his work were important, "economics with a purpose" was also important to him. Another economics professor appears to apply his knowledge of economics to involvement in community activities. A third economics professor suggested he values the contributions he has made to public policy debates. The anthropologist values the consulting contributions she makes to complex organizations, and in advancing knowledge concerning how different cultures structure knowledge. The study's archaeologist seemed to appreciate the role his work plays in advancing knowledge concerning the historical heritage of the United States. One political scientist seemed to relish his role in incubating new programs, and in promoting experiments in social democracy on campus. Another political scientist was actively involved in helping government officials understand the political dynamics of a region of the world, as well as in promoting an understanding of that region of the world within foreign policy circles. A social scientist was similarly engaged in promoting understanding of issues relating to the cultures of individual countries and the dynamics involved in relationships between countries.

Some of the work of the natural scientists was heavily theory-based. It related to solving problems relating to the structure of matter. Topics were expressed as being curiosity-driven and problem-driven. There was an appreciation of the potential benefits to humanity as they sought understanding of some of these topics. A physicist suggested that the broad goal of his work that is supported by the U.S. Department of Energy
concerned identifying alternative sources of energy. The three professors affiliated with the applied science department, were engaged in work that has potential benefits of advancing theory and with work that has practical applications. Solving problems that are identified as important to business, industry and government agencies were important to the applied scientists. Understanding characteristics of materials at the molecular level, and how they performed under different conditions was promoted as leading to development of materials with applications in many contexts.

The work of the arts and humanities professors consisted of theoretical and applied elements. The ethnomusicologist had an important performative aspect to her work, even if it was not highly rewarded within a disciplinary context. She projected an image of desiring to use her performative and other work to promote understanding of diverse cultures, as well as advancing arguments concerning the role music plays in cultural heritage and in daily lives. The work of the linguist, with the exception of one book that received substantial media attention, usually generated the interest primarily from scholars representing various fields, and from students. The classics professor, whose work may be of most immediate interest to students and representatives of his discipline, was also featured in regular exhibitions thus giving his work some popular appeal. The modern languages and cultural studies professor suggested that her approach to her work included an element of increasing cultural understanding that may in some small way promote development of community and cultural understanding at local level and between countries.
Many natural and social sciences participants reported an interest in advancing knowledge, and thus, contributing to their narrowly defined disciplinary area. They also expressed a view that their work products contributed to solving practical problems, either by contributing to public policy debates, developing new products, or in providing consulting advice to solve client problems. Concerning research agendas, study participants were varied in terms of generally following a very narrowly focused set of topics, and expressing behaviors that reflected constantly expanding topic areas. Most of the study participants engaged in some form of inter-disciplinary work, even if they did not publish outside traditional journals within their field.

**Disciplinary Values**

Expectations relating to disciplinary cultures and disciplinary departments that uphold the values of academic disciplines were probed in many ways in the questionnaire, the interview protocol, and the review of participant curriculum vitae. Many disciplines were subdivided into sub-disciplines. Disciplines frequently included multiple professional societies and multiple well-respected journals. Professors shaped and were shaped by their academic departments and disciplinary culture. Most of the professors were well-established in their fields. They have had many opportunities to have their work reviewed by peers. Professors shape their fields by participating in conferences, and reviewing the work of peers in many different capacities. Study professors valued involvement in their fields. They described attending professional conferences as challenging their thinking and promoting their engagement with their topic. Curriculum vitae data, such as lists of publications, and references to disciplinary service, indicated that study participants have been active in their fields. Most of the
professors appeared to be well connected within their disciplinary fields. However, a few professors were linked in some way to their disciplinary culture, but may not emphasize participation at the disciplinary level.

The departmental affiliation seemed to play an important role in upholding traditional values, especially relating to publishing in refereed journals. One arts and humanities professor suggested that his approach to his topic was substantially different from the most common disciplinary approach. Nevertheless, he has succeeded in publishing his research. Although peer-reviewed work and disciplinary societies exerted a powerful influence on scholarship, disciplinary influences did not appear to be overly constraining. Some professors appeared to produce some work that had been accepted for disciplinary publication, and produced additional work in which they were less concerned whether it was published in mainstream disciplinary publications.

The degree of influence of external funding varied subtly by discipline or field. Two natural science professors referenced a stable source of funding for them to investigate their research topics. Natural scientists, however, also described some of the challenges present for scientists whose work is heavily funded by federal grants and contracts. They suggested that federal funding sometimes follows fads or trends. Topical areas may be popular for a period of time, that encourages professors to develop expertise in a given area and training students to investigate topics. Professors, in general, can be left scrambling when federal funding begins to dry up in one area, which forces them to gravitate toward another area. A few natural science professors suggested that they were constantly learning new material. They encouraged their students to
develop a flexible set of skills so that they can easily change topical directions in their professional lives.

Interdisciplinary Focus

Most, but not all, study participants indicated that their work involved interdisciplinary or multidisciplinary perspectives. Some participants indicated their work drew from multiple disciplines, but that they did not necessarily collaborate with individuals outside of their field or publish in journals outside of their field. Some professors, however, indicated they have been active participants on research teams with representatives of multiple disciplines. Among the economists, one professor’s work was influenced by sociology, whereas another’s often reflected an historical context. A third economist suggested that his work for scholarly publications was usually fairly narrowly focused within the field of economics, but his public policy-related work, a substantial portion of his workload, drew from many different areas of knowledge.

The anthropologist’s work drew from multiple knowledge fields, including business and international studies. A social scientist, who managed a center that develops and incubates faculty and student programs, also promoted development of inter-disciplinary relationships, and supervised inter-disciplinary majors. A natural scientist indicated that his approach over his career has generally been narrowly focused in the area of theoretical physics. He noted that if he were starting his career today, there was a good chance it would involve greater inter-disciplinary collaboration. This same professor suggested, however, that he believed much of what is promoted as inter-disciplinary research is not true inter-disciplinary research, because it lacks depth of true
integration of multiple disciplines into thinking. He noted that true inter-disciplinary research was very time consuming and difficult to accomplish.

All of the arts and humanities professors indicated that their work in some way involved consideration of topics that drew heavily from disciplines other than their core area. The classics professor suggested his work was heavily informed by art, history, and philosophy. The linguist indicated philosophy, psychology and languages informed his work. The ethnomusicologist’s work was influenced by anthropology and music while the modern languages and cultural studies professor’s work was influenced by languages, cultural studies, diversity studies, and international affairs.

Summary Relating Emerging Themes to Research Questions

The beginning of this chapter referenced that working style themes represented the study findings concerning the research question relating to how study participants created conditions to enhance their work performance. The organizational conditions section provided evidence to answer the question pertaining to conditions that enhanced or inhibited both entrepreneurial work and work in general. The research question pertaining to how enhancements and inhibitors to working conditions may differ by broad knowledge domains was answered in the disciplinary context themes, and with related themes from the working style and organizational condition sections. Specifically, Research Question 1 and Research Question 2 both concerned the working conditions or climates that promoted or inhibited the work of study participants. Research Question 1 was an overarching study question and encompassed organizational conditions, working
styles, and the disciplinary context for entrepreneurial behaviors. Research Question 2 concerned specific conditions that facilitated or inhibited the work of nominated professors. Research Question 3 related to how professors proactively negotiated their environments to create conditions that enhanced their work and minimized negative impacts. Research Question 4, also an overarching research question, related to identifying similarities and differences between the broad knowledge areas of the study both with respect to working styles of professors, working conditions within departments and in general disciplinary context influences. Below is a summary of the themes that emerged, discussed in detail within this chapter and summarized in the next chapter, linked directly to the guiding research questions.

1. What are the characteristics of academic work climates that promote or inhibit entrepreneurial behaviors?

2. What are the key facilitators and barriers to engagement in entrepreneurial behaviors by faculty at a selective doctoral/research university?

The work of professors, both traditional work and work that may be described as entrepreneurial, was promoted when professors had the flexibility, including time, to pursue their interests. An organizational climate that suggested some level of consensus decision-making, and, in general respect for the perspectives of individual professors was referenced as a positive working condition. Released time to pursue research and other projects was suggested by study professors as important. Study professors needed resources to accomplish their work and relied on both internal resources, and external sources of funding. Work of professors may be inhibited by multiple demands upon their
time. Similarly, work may be inhibited by some conflict concerning desirability of engagement in non-traditional behaviors, but without commensurate recognition in faculty reward structures. For some professors, the general department or institution was portrayed as placing such great emphasis on traditional products, especially peer-review publications, that categories of work that were unusual or entrepreneurial were less emphasized. In some cases, entrepreneurial projects and products were not discouraged, but not necessarily encouraged, or encouraged only to the extent that those behaviors advanced traditionally scholarly work.

Those views, however, were contrasted with statements concerning active encouragement of entrepreneurial activity such as temporary assignments, de-emphasizing research to run a productive center, substantial released time, and active engagement in resource development. Although there was some general consensus among study participants concerning the attributes that inhibit or enhance their work, there was variety in the attributes that were emphasized by professors. A small number of study participants suggested that layers of performance assessment represented a time-consuming annoyance. Adequate levels of support staff and the condition of the physical infrastructure were expressed as an inhibiting factor by some study participants.

3. How do highly entrepreneurial faculty negotiate and shape their environments to create conditions that enhance their work performance?

Study professors displayed attributes that were common to many study participants, as well as unique qualities. They assertively and opportunistically sought
resources to support their work. The study professors juggled multiple tasks, even if they preferred to focus on a predominant project. Study professors displayed knowledge of their departmental and institutional and disciplinary work environments. Collaborating with disciplinary peers was important for study professors. Drawing from multiple disciplinary perspectives was a common approach for study professors. Professors expressed a working style that balanced teaching, research, institutional and disciplinary service, with professors expressing varied emphases on those broad categories of work. For this study, research roles may have received greater emphasis in discussion than teaching and service. Administrative roles, including managing staff and budget, was also an important aspect of study participants' working styles, with most participants either currently holding an administrative role or having done so in the recent past. There was some expression of revolving in and out of administrative roles, and in general of emphasizing different activities at different points of their careers and during the calendar year.

Time and place of work were important considerations. Some professors preferred routines and the office environment for work. Most professors, while appreciating routine to some extent, also valued flexibility to pursue emerging opportunities. A home office was described by many professors as important for writing projects. Working during non-routine hours such as early morning, late at night and on weekends was typical for study professors. Many study professors provided information that suggested that their working styles were consistent with attributes of entrepreneurs and creative individuals. They attempted to control their time. Control of time was suggested by Csikszentmihalyi (1996) as important for creativity. Professors were aware
that engagement of multiple tasks simultaneously was an effective way to increase productivity. Doing so allows time for incubation of ideas for one project while working on another project.

Study professors made comments suggesting they have an intrinsic interest in their work and that their work has important implications. Study participants expressed characteristics associated with an achievement orientation and tenacity as well as perseverance. They committed themselves to master a knowledge domain, and have obtained recognition for their effort. Their attitudes reflected passion and commitment for their work.

Investment in relationship networks was common among study participants. Many study participants combined a working style that combined individual or solitary work with collaborative work. They expressed social skills to facilitate their productivity and overall achievement. Many study participants appreciated the applied or societal benefits of their work. Study professors were like entrepreneurs in their roles of developing academic centers and programs, with functions such as securing resources, managing staff, and making decisions about organizational growth. Like entrepreneurs, study professors assembled teams of people to work toward common goals. A common working style of study professors was starting something new, marketing their ideas or products, and engagement in unique activities.

4. In what ways, if any, do the entrepreneur-related behaviors of academic entrepreneurs and key facilitators and barriers to engagement in entrepreneurial behaviors by faculty, vary by disciplinary domain?
For this study, themes applicable to many study participants were identifiable, but less distinguishable by broad disciplinary areas. The responses to the research questions above and discussed throughout Chapter Five and summarized in Chapter Six indicated the major themes that appeared to cut across broad knowledge areas. A few subtle differences in broad knowledge areas were detected. Natural scientists in general appeared to rely more heavily on sponsored research funding and on graduate students to accomplish their work. Patent work was of significant importance only to the natural scientists. Internal funding appeared to be very important for the social scientists and arts and humanities professors. In that regard, some form of released time to pursue scholarly work for all three categories appeared important. It was very important for several of the arts and humanities professors. The social scientists and natural scientists appeared to experience some conflict concerning the extent of rewards for certain categories of work such as patents helping with business start-ups for natural scientists, and client related reports for the social scientists. The natural scientists may have had greater concerns for the condition of infrastructure such as buildings and availability of specialized equipment. Traditional work products appeared very important to all three broad knowledge areas. Several of the social science professors may have taken paths, however, that de-emphasized traditional scholarly publishing in exchange for highly successful administrative roles, including development of programs.

Summary of Similar Themes Across Disciplines

The study provided evidence of the similarities concerning working style attributes, including work products and working conditions, among study participants.
Participants in the social sciences, natural sciences and arts and humanities obtained resources to support their work. Internal resources were available within all three broad knowledge areas, and professors opportunistically identified and pursued external funding. Representatives of all areas assumed administrative functions, frequently as center directors. Participants from the three areas valued traditional academic work products. Released time to pursue research and temporary roles is important for professors in all three areas. Study professors were heavily influenced by their department and disciplinary organizations. Participants in the three areas engaged in inter-disciplinary work. For all the areas, the shapers of knowledge domains such as funding agencies, editors, and individuals influential in disciplinary societies, influenced, but did not totally dominate research topic selection of study participants. Professors from all three knowledge areas were heavily influenced by their disciplinary cultures, as well as performed important functions in shaping their fields. Study professors from all three broad knowledge areas protected their independence, and accepted responsibilities for shared governance. Professors in all three knowledge areas described entrepreneurial behaviors in terms of specific work products, and as a broader general style of work that emphasized starting something new or performing unique or unusual projects or roles.

Summary of Differences Across Broad Knowledge Areas

Except for those social scientists and the arts and humanities professor involved in center administration, natural scientists appeared to have a greater expectation to pursue external funding, although at least one natural scientist indicated that there is not always an expectation that the individual professor will be successful. Natural scientists considered as a group generally obtained individual sponsored research grants that were...
larger than social sciences and arts and humanities. Nevertheless, considered collectively and individually, social scientists and arts and humanities professors obtained external funding in large amounts and for multiple projects. For this study, the natural scientists were the only group who had any interest in issues relating to patents and licensing. References to consulting were frequently made in the context of institutionally sponsored projects, rather than as outside consulting. Natural scientists and social scientists appeared to engage in consulting more frequently, although arts and humanities professors referenced consulting as one of their activities.

Representatives of all three knowledge areas emphasized peer-reviewed publications as important criteria for evaluation. The social sciences, however, appeared to include more professors who had assumed administrative roles in which peer reviewed publishing was less of a major consideration. The researcher did not detect for the natural sciences, or for the arts and humanities, except possibly one in the latter area, that administrative roles for those areas relieved them of obligations to engage in production of peer-reviewed work.

Content analysis of curriculum vitae concerning peer reviewed publications, non-peer reviewed publications, and conference proceedings suggested that professors engaged in varied levels of activity. However, given differences in career stages, and intentional career emphasis, it was not appropriate to suggest that representatives of one broad knowledge area were more productive than another, or that some individual professors were more productive than other professors. A reasonable statement to make,
however, when considering the work of some of the most senior professors in each broad knowledge area, is that peer-reviewed publications and presentations before disciplinary organizations was an important value. The same was true of extensive institutional governance and service. For all three areas, peer-reviewed journal articles appeared to be the most highly valued disciplinary product. However, books and monographs, particularly in the social sciences and arts and humanities appeared to be viewed as important products.

Professors in all three knowledge areas referenced their work as containing applied implications and theoretical foundations. Natural scientists described their work as either curiosity-driven or problem-driven, or, as a combination of both approaches. Both quantitative and qualitative approaches to research were evident in the work of the social scientists and arts and humanities professors. The work of the natural scientists emphasized quantitative approaches. Some work for the physicists emphasized theory over experimentation.

During a teaching semester, arts and humanities professors appeared to reference larger teaching loads than natural scientists or social sciences. The arts and humanities professors, however, were able to obtain released time during certain times to concentrate on research projects. Relative time given to teaching, research, service or administration varied by individual professors and routinely changed at different times.
Teaching responsibilities received some mention by study professors as reflecting a part of their entrepreneurial style. For two social scientists, classroom-related activities appeared to be an important part of their entrepreneurial style. Graduate students were an integral part of the research natural scientists conduct for federal agencies and industrial clients. Only one of the arts and humanities professor substantially referenced teaching as part of her entrepreneurial working style.

Table 9 presented below represents a summary of cross case data analysis.
Table 9: Cross Analysis of Case Themes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Social Sciences</th>
<th>Arts and Humanities</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Working Style Themes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time and Place of Work</td>
<td>• Varies. Early morning hours. Late evenings. Weekends. Office work and home work. Office good for routine.</td>
<td>• Routine very important for one.</td>
<td>• Varies. Early morning important for a couple.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Two very early morning hours are important. Office important for routine work.</td>
<td>• One often wakes up in middle of night to work. Office and laboratory important, but so is home office.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• One pragmatic about research that can be accomplished during academic year. Writer's cottage and summer residence important for one.</td>
<td>• Hideaway work locations important for one.</td>
</tr>
<tr>
<td>Incubation of Ideas</td>
<td>• Times of focus and multi-tasking</td>
<td>• Important</td>
<td>• Important</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unique Qualities and Roles</td>
<td>• Client service. Legislator. City Council Decisions to de-emphasize research to pursue program development and client projects.</td>
<td>• One working outside of department for more flexibility, opportunity to build program. One very successful obtaining research leaves - three times two years consecutively.</td>
<td>• Living outside the lines to some extent for one. Significant role in bringing federal lab to region for another.</td>
</tr>
<tr>
<td>Passion for Work</td>
<td>• Yes. Purpose expressed by many</td>
<td>• Yes. Discussed intrinsic interest Missionary zeal</td>
<td>• Yes. One carves out some work just for its enjoyment. One expressed perfectionist attitude about publications. Another driven to exhaustion to learn new material.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Knowledge</td>
<td>• Consensus building important for several Collaboration important.</td>
<td>• Yes. Relationships described as important.</td>
<td>• Yes. Influencing small groups. Pulling together collaborative teams.</td>
</tr>
<tr>
<td>Teaching</td>
<td>• Some references to part of entrepreneurial style.</td>
<td>• Some had large loads. Released time important.</td>
<td>• Integrated with research. Preparation for employment important.</td>
</tr>
<tr>
<td>Governance/Institutional Service</td>
<td>• Appeared to be important component of work for all but two.</td>
<td>• Important, but an area in which several noted they may de-emphasize at times. One noted tuning in and tuning out.</td>
<td>• Appeared to be important to several, especially given their administrative roles. De-emphasis at times for some.</td>
</tr>
</tbody>
</table>
Table 9: Cross Analysis of Case Themes (Continued)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Social Sciences</th>
<th>Arts and Humanities</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Style Themes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative Roles</td>
<td>■ Yes. Seven of eight reported current or past. Major current role for several.</td>
<td>■ Yes. Probably more involvement for two professors than the other two in this knowledge area.</td>
<td>■ Yes. Three with substantial admin. roles</td>
</tr>
<tr>
<td></td>
<td>■ Some departmental and some institution-wide</td>
<td></td>
<td>■ One with possibly more limited role</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>■ Other without admin. role</td>
</tr>
<tr>
<td>Center or Program Development</td>
<td>■ Major activity for many</td>
<td>■ Some, but not as common as other two areas</td>
<td>■ Several involved in center development</td>
</tr>
<tr>
<td></td>
<td>■ Some de-emphasis on own research and publication due to role</td>
<td></td>
<td>■ Vehicle for research</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>■ Institution wide center for one</td>
</tr>
<tr>
<td>Traditional Academic Work Products</td>
<td>■ Peer reviewed journal articles</td>
<td>■ Peer reviewed journals</td>
<td>■ Peer reviewed publishing, mostly journal articles.</td>
</tr>
<tr>
<td></td>
<td>■ Books also important</td>
<td>■ Books important also</td>
<td>■ Sponsored research</td>
</tr>
<tr>
<td></td>
<td>■ Disciplinary society leadership common</td>
<td>■ Disciplinary society leadership common</td>
<td>■ Disciplinary society leadership common</td>
</tr>
<tr>
<td>Nontraditional Work Products</td>
<td>■ Client reports</td>
<td>■ Generally, traditional products for discipline.</td>
<td>■ Advising on business start-ups</td>
</tr>
<tr>
<td></td>
<td>■ Center Development</td>
<td>■ One professor working outside department in administrative role.</td>
<td>■ Patent and licensing work</td>
</tr>
<tr>
<td></td>
<td>■ Private fund raising</td>
<td>■ Grant activity reported. In general, not as large grants or total numbers as other categories.</td>
<td>■ Industry collaboration</td>
</tr>
<tr>
<td>Resource Development</td>
<td>■ Funding from varied sources such as federal grants and contracts, business clients, private fundraising.</td>
<td>■ Internal grant support important.</td>
<td>■ Sponsored research major activity.</td>
</tr>
<tr>
<td></td>
<td>■ Productivity varied to limited activity to one of most productive in study.</td>
<td></td>
<td>■ Some on-going federal support.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>■ In general, larger dollar amounts for funding than other two categories.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>■ Some funding as part of collaborative teams</td>
</tr>
</tbody>
</table>

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Table 9: Cross Analysis of Case Themes (Continued)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Social Sciences</th>
<th>Arts and Humanities</th>
<th>Natural Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organizational Condition Themes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy, Freedom, Flexibility</td>
<td>• Important</td>
<td>• Important</td>
<td>• Important</td>
</tr>
<tr>
<td></td>
<td>• Appreciated dialogue with administration, but independence important.</td>
<td>• Valuable to go in different directions unencumbered by departmental or institutional constraints.</td>
<td>• Value institutional resources and recognition, but need independence to do their work.</td>
</tr>
<tr>
<td></td>
<td>• Some references to program success in part attributable to freedom to move in directions professors see fit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tension Between Traditional Faculty Expectation and Entrepreneurship</td>
<td>• Tension for a few concerning effort expended on some activities versus reward structure.</td>
<td>• Researcher did not detect as much tension as other knowledge areas. Exception may be for one whose work involves performance in addition to teaching, service, and research.</td>
<td>• Some references to competing demands on time -- staying current with research work while performing admin. roles</td>
</tr>
<tr>
<td>Working Condition Improvement</td>
<td>• Need for additional support staff noted by several</td>
<td>• Additional resources</td>
<td>• Facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Lighter teaching loads for some</td>
<td>• Some references to need for support staff</td>
</tr>
<tr>
<td>Criticism Associated with Entrepreneurial Behavior</td>
<td>• Yes for some</td>
<td>• Yes. Some criticism for one for academic leaves associated with funding.</td>
<td>• Individuals in other departments may value NSF more than industry relations</td>
</tr>
<tr>
<td></td>
<td>• Possible delay in promotion to full professor for one.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitating Working Conditions</td>
<td>• Freedom, flexibility</td>
<td>• Freedom</td>
<td>• Freedom</td>
</tr>
<tr>
<td></td>
<td>• Able to secure resources</td>
<td>• Flexibility</td>
<td>• Availability of sponsored research funding</td>
</tr>
<tr>
<td></td>
<td>• Communication</td>
<td>• Released time</td>
<td></td>
</tr>
<tr>
<td>Theme</td>
<td>Social Sciences</td>
<td>Arts and Humanities</td>
<td>Natural Sciences</td>
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<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Disciplinary Context</strong></td>
<td><strong>Themes</strong></td>
<td><strong>Themes</strong></td>
<td><strong>Themes</strong></td>
</tr>
<tr>
<td></td>
<td>Mixed. For some emphasis on theory for publishing, but engaged in applied projects also.</td>
<td>For some applied and theoretical approaches. Permanences, building programs, exhibits as applied examples.</td>
<td>Mixed. For applied scientists both applied and theoretical aspects of work important.</td>
</tr>
<tr>
<td></td>
<td>Overall, a lot of applied emphasis (studies, reports, program development).</td>
<td>Theory important also.</td>
<td>Physicists primarily theory. One noted, however, his work is between curiosity driven and problem-based.</td>
</tr>
<tr>
<td><strong>Applied or Theoretical Emphasis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Disciplinary Values</strong></td>
<td>Institution reward structures may emphasize traditional publishing, but many interested in other, less rewarded activities.</td>
<td>Same as social sciences: traditional reward structures emphasizing publications, but some interest especially for two, in involvement in less traditional activities.</td>
<td>Same as other two categories. Emphasis on publishing, but active engagement in other activities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For applied teaching and research complementary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unclear on how patents may be rewarded, with some statements that they may be treated like publications.</td>
</tr>
<tr>
<td><strong>Interdisciplinary Focus</strong></td>
<td>Yes. Many observations concerning interdisciplinary focus: 7 of 8 participants in some form.</td>
<td>Yes. All noted some use of interdisciplinary approaches to their work.</td>
<td>Yes. Most referenced collaborating with experts with other fields.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One indicated interdisciplinary work not important to him.</td>
</tr>
</tbody>
</table>
CHAPTER SIX: DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

Introduction

Individual case study analysis presented in Chapter Four and analysis across cases with identification of emerging themes presented in Chapter Five provided evidence to support the general themes summarized and discussed in Chapter Six. The themes are organized by the categories of working styles, organizational conditions, and disciplinary context. Themes address topics associated with the similarities and differences among broad knowledge areas. Study themes are linked in this chapter to relevant literature, and to the study's conceptual framework. Chapter Six also includes implications for future research and implications for the practice of higher education.

Discussion

This section of Chapter Six discusses the three broad themes of working styles, organizational conditions, and disciplinary context in relation to the literature on entrepreneurship.

Working Style Themes

Working styles of study participants were unique, and depended on issues such as workload, time of year, career stage, availability of opportunities, and interests. Study participants expressed an awareness of conditions that facilitated their work and actively sought to create their work environments. The professors engaged in multiple activities simultaneously, but often organized their time to focus on a dominant project. Important work was often conducted during non-traditional working hours such as very early morning, late in the evening, and on weekends. Professors valued routines to some
extent, but also embraced flexibility to respond to emerging opportunities. Elements of flexibility have been found to be associated with entrepreneurial behaviors and innovations in organizations as well as with individual creativity (e.g. Kanter, 1988).

Place of work depended on type of activity, with offices preferred for routine work, and collaborative work. Early or late hours at home were often preferred for writing projects. Study participants expressed an active awareness of conditions that enabled them to achieve optimal productivity. Active control of time is associated with creativity (e.g. Csikszentmihalyi, 1996; Harrington, 1999) and task-oriented and focused entrepreneurs (e.g. Bird, 1989; McClelland, 1987; Swayne & Tucker, 1973 cited in Bird, 1989; Timmons, 1989). Csikszentmihalyi (1996) suggested personal creativity is enhanced when individuals do more of what they want to do and less of what they have to do. Similarly, entrepreneurs are associated with a desire for and ability to control their activities (e.g. Mitton, 1989).

Professors made comments suggesting they have an intrinsic interest in their work and believed their work had important implications. In addition to expressing enthusiasm or intrinsic interest in their teaching and research, study participants devoted time and energy to activities such as community or institutional service, and work products such as client reports that may or may not always be highly rewarded for promotion and merit purposes.

Study participants expressed characteristics associated with an achievement orientation as well as tenacity and perseverance, overcoming obstacles, commitment, and
passion for their work. These characteristics are all associated with both entrepreneurial and creative individuals (e.g. Amabile, 1988, 1996; Csikszentmihalyi, 1996; Gruber, 1988 in Sternberg, 1988; McClelland, 1987). Like many entrepreneurs and creative individuals, they committed themselves to mastering a knowledge domain, and having obtained differing levels of recognition for their effort.

Investment in relationship networks and creative collaboration common among study participants is associated with entrepreneurs and innovation in organizations (e.g. Bird, 1989; Bennis and Biederman, 1997; Kanter, 1988; Mitton, 1989). Many highly creative individuals are reported to alternate times working independently, with collaboration. They frequently express highly developed social skills to facilitate their productivity and overall achievement. Since many of the study participants appreciated the applied or societal benefits of their work, working styles commonly attributable to innovators in many contexts was present among study participants. Innovation and entrepreneurial creativity related to putting good ideas to work. Study professors were like entrepreneurs in their roles of developing academic centers and programs, with functions such as securing resources, managing staff, and making decisions about organizational growth. Like entrepreneurs, study professors assembled teams of people to work toward common goals. A common working style of study professors that was also frequently associated with general attributes of entrepreneurs was that of starting something new, including organizations, marketing ideas and products, taking innovative approaches to solving problems, and engaging in unique activities (e.g. Drucker, 1993; Mitton, 1989; Sexton and Smilor, 1997).
Study participants were actively engaged in resource development. They secured resources from external and internal sources. Resources came from sources such as federal agencies, state agencies, corporate and private foundations, individuals, and industrial partners. Engagement in sponsored research is a common attribute in studies relating to academic entrepreneurship (e.g. Fairweather, 1988; Louis et al.; Slaughter & Leslie, 1997; Fairweather, 1988). The researcher does not believe literature pertaining to academic entrepreneurship, however, emphasizes the significance of internal sources of funding as a category of academic entrepreneurship. For many of the study participants, internal resource support combined with external support was important.

Participants were experienced proposal writers, with extensive knowledge of how to negotiate the funding process. Funding amounts for projects ranged from many smaller grants below $5,000 to multi-year multi-million dollar grants. In general, natural scientists obtained larger total grants. However, social scientists and arts and humanities professors also obtained funding of substantial dollar values. Natural scientists relied primarily on government sponsored and industry grants and contracts. Social scientists and arts and humanities obtain government support, corporate client project support, and support from private fund raising. To some extent, especially among professors from the natural sciences and social sciences, the preferences of funding agencies influenced the research directions of professors.

Obtaining external and internal resources to perform scholarly research and present scholarly programs in the academic context was compared to obtaining funding from banks, venture capitalists, and individuals in the business context. The academic
and business contexts required demonstration of the viability of ideas and soundness of plans to accomplish goals. Both contexts required a match of the interests and expectations of the potential funding sources with the proposals of the business entrepreneur or academic entrepreneur. Entrepreneurship in the business context represented an opportunity for individuals to create useful goods and services and accumulate wealth (e.g. Sexton & Smilor, 1997; Solomon & Winslow, 1993). Some forms of entrepreneurship in the academic context enabled faculty to develop resources to advance scholarly research and disseminate knowledge. Entrepreneurial behaviors relating to external resource development enabled professors to engage in activities that departmental and institutional budgets may not have been able to support.

Most study participants had performed administrative roles on a permanent or temporary basis. They were deans, department chairs, center directors, and program coordinators. Academic center development was an important expression of entrepreneurial work for study participants. Center development was referenced as a means professors used to advance research agendas, and was sometimes considered an innovative or entrepreneurial organizational structure (e.g. Fairweather, 1988 citing Friedman & Friedman, 1984, 1985, Teich, 1982; Ikenberry & Friedman, 1972; Stahler & Tash, 1994). Typical center management functions included research, resource development, budgeting, management of staff, and project coordination. Centers emphasized academic research, but some centers had multiple functions in addition to research. General academic program development, closely related to center development, was also a major activity of study participants. Considering the managerial aspects of center development, sponsored research and special projects as similar to the...
process of entrepreneurs starting a business was not emphasized by researchers considering the topic of academic entrepreneurship. It was, however, an important conceptualization of entrepreneurial behavior for this study, and was confirmed by statements of study participants.

Administrative roles, including center start-up and management, related closely to the multiple roles commonly associated with the entrepreneurs from a business perspective. As with start-up business operations, center development required generating ideas to market to external audiences, and obtaining resources needed to produce the product. Both also involved providing vision and leadership to encourage organizational development, and recruitment of employees to perform various roles to benefit the organization. Academic centers in general, and for the study participants particularly, as well as business entrepreneurs featured the strengths of individuals, but with the recognition that as the organization grows, there is a necessity for support staff, and for involvement of individuals with complementary skills. Like businesses, academic centers differed in size, shape and purpose. The profit orientation of businesses and growth in sales of a business, can be loosely compared to certain products of higher education such as external funding, scholarly publications, research findings, and programs presented in an academic context.

Organizational Conditions Themes

Traditional academic values such as freedom, autonomy, and independence were highly valued and contributed to work climate issues. Professors expressed a willingness to expend the energy necessary through institutional governance and service to preserve,
protect, and extend values associated with shared governance. Departmental and institutional conditions were generally indicated as facilitating overall productivity. Freedom to pursue topics of interest was referenced by study participants as important to their entrepreneurial working style. Freedom of choice concerning work projects and means to accomplish work-related functions is associated with organizational and individual creativity (e.g. Amabile, 1988, 1996; Arad et al.; Kanter, 1988). Study professors balanced their desire for independence with a recognition of the value of departmental and organizational support. Professors valued some level of communication including encouragement and feedback on valued work products from departmental and central administrators. Communication and recognition of performance were referenced as promoting a creative working climate (e.g. Amabile, 1988, 1996, 1998). Sometimes, however, professors expressed a desire to be left alone to perform their roles.

The importance of released time from routine responsibilities to pursue research interests or administrative roles was noted by many study professors. Released time promoted focused concentration, time for incubation of ideas, and time for reflection all of which are important for individual and organizational creativity (e.g. Amabile, 1996; Csikszentmihalyi, 1990, 1996; Smith & Dodds, 1999). Study professor’s ability to focus on projects can be compared with the single-minded focus to achieve their goals that have been associated with entrepreneurs in a business context (e.g. Mitton, 1989). With some exceptions, professors suggested that they were able to secure the time and resources they needed to be productive. Time to pursue creative interests was considered fundamental to generating creative ideas and products. Adequate resources were considered an
integral part of entrepreneurship in a business and general organizational context, and in
the enhancement of creativity in individuals and organizations (e.g. Amabile, 1996;
Bennis & Biederman, 1997; Kanter, 1988; Mumford & Simonton, 1997). General
working conditions that emphasized flexibility for professors to respond to emerging
opportunities was expressed as valuable for many study participants.

The academic values and general organizational conditions of the study institution
were consistent with the researcher’s understanding from a review of relevant literature
of strongly held academic values and institutional cultures. Professionals within
organizational contexts, including higher education, highly value independence,
authority, and autonomy concerning how they accomplish their work functions (e.g.
Birnbaum, 1988; Blau, 1994; Clark, 1963; Etzioni, 1964; Rosovsky, 1990). Some control
over working conditions, including choices of projects increases intrinsic motivation,
which in turn may lead to higher levels of productivity and achievement (e.g. Amabile,
1996).

Inhibitors to Faculty Work

While in general study professors were able to structure their time, obtain
resources, and generally shape their environments to successfully perform their roles,
there were working conditions that could be improved. The multiple demands upon
professors’ time can create fragmented attention and limit productivity. Amabile
highlighted the impact that demand upon time can have for creativity in asserting “even
the minor daily demands of relatives, friends, and colleagues can act as social constraints
that undermine creativity. It appears that highly creative individuals must often resist
those sources of external control” (Amabile, 1996, p. 8). The individuality of working styles and the importance of type of work both for this study and in the literature relating to creativity, however, suggested that for some individuals and for some projects, social contact and noisy surroundings may stimulate the creative process. Also engagement in multiple tasks simultaneously, negotiating environments with high levels of ambiguity and complexity, tasks are associated with stimulating organizational innovation and creativity (e.g. Csikszentmihalyi, 1996; Kanter, 1988).

Large teaching loads for a few professors were referenced as limiting time for other categories of work. Obligations concerning institutional service were also sometimes expressed as making large demands on their time. A lack of availability of support staff was described by some professors as affecting what could be accomplished in other areas. Among the demands upon time and attention that professors appeared to dislike were what they described as a tendency over the years to add additional layers of assessment or, in general, activities that made professors account for their time. Post-tenure review, annual merit reviews, and information that must be routinely reported relating to teaching and research were referenced as cutting into their already full workloads.

Generally, but not unanimously, study professors came from departments that appeared to uphold conservative, traditional academic values of teaching, research, and service. Peer-reviewed publishing was described as an important metric for success by many study participants. Although most of study participants were senior professors who placed important emphasis upon peer-reviewed publishing, there appeared to be an
acknowledgement, among some study participants that the department and institution may simultaneously encourage exploration of less traditional or different activities that are commonly described as entrepreneurial, but that those activities were rewarded less than traditional scholarship. For many study participants, entrepreneurial inclinations led them to some activities that are non-traditional and time consuming and are rewarded less than traditional activities. For most of those professors, they must continue to attend to peer-reviewed publishing. In this way, some professors portrayed the study institution as valuing entrepreneurship, but not to the extent of aligning reward structures to promote an entrepreneurial culture.

The quality of institutional facilities were referenced by some professors as potentially inhibiting their work. Facility problems appeared to be of greatest concern to natural science professors whose work involved experiments with sensitive and technologically advanced equipment that could be easily disrupted with mechanical problems. Proactively shaping space for work and other pursuits was found to be important to creative work (e.g. Csikszentmihalyi, 1996).

Study participants expressed attributes of conforming to departmental, institutional and disciplinary norms, with flashes of independence and performing roles and engaging in activities regardless of whether they were rewarded or conformed to expectations of the groups with which they are affiliated. Professors may be rewarded and valued by their institution for their ability to balance obligations and maintain a level of independence.
Disciplinary Context Themes

Multi-disciplinary work was an important aspect of the work of study participants. Professors acknowledged that their research and teaching was enhanced by obtaining understanding of diverse knowledge areas. For some study participants, their interdisciplinary approach involved understanding different disciplines that influenced their work, but their primary work was within a single discipline, and their peer-reviewed work was primarily directed to professional organizations within their field. Work for some study participants involved projects with colleagues from disciplines other than their own.

The intensity of multi-disciplinary work varied among participants, although the researcher did not detect substantial differences in broad knowledge areas. An exception was for the tendency of several natural scientists to serve on multi-disciplinary research teams, whereas the arts and humanities professors, and several social scientists may have used multiple approaches in their conceptualization of topics, but not as much as part of multi-disciplinary research teams. Some topics in the social sciences, natural sciences, and arts and humanities required multiple disciplinary perspectives. Study participants recognized the value of both focused research in a narrow area, and the importance of viewing some topics from multiple perspectives. Creativity researchers and philosophers of science, among others, indicate that mastery of a specific domain, is important but that creative breakthroughs often occur around the edges of knowledge domains and draw from multiple perspectives (e.g. Csikszentmihalyi, 1996; Kanter, 1988; Kuhn, 1996; Wilson, 1998).
Departmental representatives, including study professors, preserved traditional disciplinary values concerning peer-reviewed publishing. Traditional work products were emphasized by most study participants. Examples of work products in which professors raised a question, or some degree of uncertainty concerning how highly valued the activities were in the reward structure of their department, included policy studies for clients, performance activities, grants that do not also lead to publications, advising former students who start a business, and patent and licensing activities. Involvement in disciplinary societies was an important part of the work of entrepreneurial professors. Societies offered opportunities to exchange ideas, stimulated thinking, re-energized professors, and provided opportunities for identification of collaborators. Collaboration at the departmental, institutional and disciplinary levels was an integral part of study participants’ working styles. Professors in the three broad knowledge areas shaped their time and working space, and pursued topics that appeared to be of intrinsic interest to them.

Levels of expertise and disciplinary competency for study participants was not easily measured or observed. However, since most participants held terminal degrees, had earned tenure and were promoted to the highest academic ranks, had published widely in their fields, and often held high ranking administrative and professional association roles, study participants displayed common indicators suggesting disciplinary competency and expertise. Simonton (1994, 1999) suggested that quantity and quality of work is associated with high levels of creativity. Knowledge domain expertise is described by some creativity researchers as a pre-requisite for creativity that leads to
knowledge domain breakthroughs (e.g. Csikszentmihalyi, 1990, 1996). Entrepreneurs are commonly associated with both a broad knowledge of multiple areas of business or organizational management, but with some degree of expertise in a knowledge specialty (e.g. Mitton, 1989). Study participants reflected attributes of creative individuals, entrepreneurs, and productive faculty with their display of work products indicating expertise, and their expression of social knowledge or human relations skills such as consensus-building, understanding of departmental and institutional politics, building relationship networks to associate with individuals with complementary skills, and to develop resources.

Conclusions

This study explored issues concerning the unique qualities of behaviors of professors identified as entrepreneurial. It examined organizational and disciplinary context factors that influenced the type and intensity of engagement of various activities by study participants. The study approach recognized the multiple layers of influence upon the working styles of entrepreneurial professors. Individual knowledge, skills, interests, and preferences influenced the professors' general working style. Study participants were adept at negotiating and shaping their work environments to enhance their productivity. In addition to individual characteristics, professors' work was influenced by multiple interacting departmental, university and societal contexts that both constrained and enhanced the work of individual professors.

Academic entrepreneurship, for this study, solidly reflected behaviors and work products typically reported in the literature as entrepreneurial, such as center and resource
development for all three broad areas, and some commercialization of ideas for at least two natural scientists. The study also provided evidence for an expanded definition of academic entrepreneurship to include individual working style attributes. Examples of the expanded definition of academic entrepreneurship included a flexible working style, operating opportunistically including extensive collaboration on projects, and, in general, expressing working style attributes associated with entrepreneurs, innovators, and entrepreneurially creative individuals.

The dominant connotations of entrepreneurial activity for this study, indicated by the analysis of the seventeen individual cases and analysis between cases, represented starting something new, seeking new opportunities, moving forward, and productivity in multiple areas. Building new programs, coordinating and organizing resources through centers, developing academic programs, and obtaining resources were also important. Those expressions of entrepreneurial behaviors were as apparent as some other activities that are commonly associated with academic entrepreneurship such as starting a business, substantial consulting for profit, or profiting from a patent or licensing agreement.
Implications for Future Research

The case study approach to studying the topic of academic entrepreneurship, with descriptions of individual cases and emerging themes, raised new questions that can be explored by other researchers. The conceptual framework could be explored in greater detail to assess additional influences upon the work of professors. The model represented an organizing framework for considering the multiple influences upon an individual professor. The framework was useful in helping shape questions for the questionnaire, and interview protocol. However, the model was used only as a general guiding framework. For this study, the broad categories of the model such as individual, institution and department, and discipline received the most consideration. Within each of the broad model categories, few of the model elements were explored in detail. Study of the behaviors of academic entrepreneurs by probing the model more deeply could advance understanding of influences upon behaviors of professors and the processes that shape their behaviors. The rationale of the model recognizes the multiple influences on an entrepreneurial working style, individual characteristics, departmental conditions, institutional conditions, and knowledge domains.

The behaviors generally associated with academic entrepreneurship within higher education literature were part of the behaviors of study participants, including center development, resource development, consulting, and commercializing ideas. The study also suggested that terms associated with entrepreneurship are used informally, and are just as likely to include a general working style that involves starting something new, changing directions, maintaining vitality, and expressing an opportunistic style. The term entrepreneurial creativity, described by Amabile (1997) and referenced by Bird (1989),
fits the broader, sometimes informal, description of academic entrepreneurship. Studying the phenomenon of entrepreneurial creativity in an academic context may be an important approach to studying behaviors of professors that emphasizes the processes they employ to negotiate and shape their work environments. Further research might explore this avenue.

A challenge researchers must overcome if they advance topics associated with entrepreneurial creativity would be to distinguish that term from topics such as faculty vitality, faculty creativity, and faculty productivity. Topics associated with faculty career stages and with influences of departmental, institutional, and disciplinary cultures are also closely related to the expanded view of academic entrepreneurship. Researchers may consider whether the topic of academic entrepreneurship appropriately belongs to a fairly narrow set of behaviors such as center development, business and industry contacts, and sponsored research or to the expanded view of this researcher that emphasized a general working style.

There are many questions that researchers critiquing or contemplating a qualitative approach to this topic could consider. Would greater depth on a fewer number of study participants yield as useful or more useful insights? What are other options for handling the nomination process? The researcher attempted to balance a process that gave general parameters of what one might expect to find in entrepreneurial behaviors with a desire to leave open what nominators may consider entrepreneurial. Nominators provided some information concerning the basis upon which they made their recommendations, but did not provide substantial detail.
Researchers considering a case study approach to the topic of academic entrepreneurship must also consider whether study data and procedures support themes as representing a general sample of the arts and sciences division, as providing evidence leading to defensible assessments between broad categories of knowledge areas, and as providing valuable data from individual cases. Evidence in this study suggested that all three levels of study are possible and can provide useful insights into the working styles and working conditions of entrepreneurial professors.

Implications for the Practice of Higher Education

The themes that emerged from this study concerning the working styles of and influences upon the work of professors nominated as entrepreneurial provided confirmatory evidence of categories of working styles and work products that are highly valued within American higher education. The case study approach provided a useful complement to quantitative approaches to faculty work. It provided insights concerning the context and subtleties of important organizational conditions and personal working styles.

The study, which focused on the experiences of individual professors, most of whom are senior professors, and how they successfully negotiated their work environments, can provide insights to academic policy-makers considering institutional priorities and individual faculty needs and desires. As academic policy-makers face difficult questions concerning faculty use of time, it is incumbent upon academic administrators and rank and file professors to reinforce messages concerning the unique
working styles of professors, and the flexible use of time they need to engage in research and development activities.

The perspectives of the study participants can also provide valuable insights for junior faculty members immersed in the socialization process concerning the multiple behaviors that are highly valued in their departmental and disciplinary contexts, and the balance of advancing their own individual, unique working styles within the constraints of their institutions and disciplinary fields. In this way, the study could be useful for deans, department chairs, faculty mentors, and other individuals interested in the professional development of professors by providing a series of templates for academic career development.

The case studies of professors concerning working styles they utilized to shape and negotiate their work environments can be useful in considering attributes for faculty development and faculty mentor programs. Topics that were raised by professors concerning techniques they have developed to help them obtain their best results can be useful for new and experienced professors. Some of those examples included building consensus and looking for “win-win” situations, building relationship networks that included short and long-term collaboration, and cobbling things together. Other useful working style strategies revealed by study professors included thinking in terms of expanding and intersecting spheres of influence, finding a unique working style that may be adapted according to work projects, putting in the extra effort to make projects happen, delegating responsibility for projects, managing resources efficiently, and spending time with groups they want to influence. In addition, professors noted a style of
alternating work on multiple projects simultaneously at times and drawing from multiple perspectives, with a single-minded focused approach at other times was valuable. The collective experiences of professors can inform those interested in professional development of faculty of proactive working style strategies professors can use to advance their work. Many of those strategies combine elements of a systematic disciplined approach and playfulness, flexibility or experimentation that is often associated with entrepreneurship and creativity.

The case studies may confirm or stimulate thinking for academic administrators and external policy-makers of the departmental and general organizational conditions that help or hinder the work of professors. The case studies emphasized the importance of flexible use of time, access to resources for projects, and released time to pursue creative projects for promoting academic productivity. Professors also suggested they value access to markets, and some level of publicity and recognition for their work. The study also emphasized the unique and dynamic working styles of professors. In that regard, the study provided evidence to build support for tolerance for entrepreneurial behaviors.

Entrepreneurial behavior or the associated term of entrepreneurial creativity may at times be idiosyncratic, nonconformist, and difficult to understand. However, the professors’ stories in this study suggest that such behaviors can help lead to important academic achievements for professors. Quotes of study professors illustrate the cultivated uniqueness of study professors, and the power of entrepreneurial creativity. A natural scientist said, “they call me a renegade. It is like having a great hunting dog and it doesn’t always come back when you whistle.” An arts and humanities professor suggested “I knew what I wanted to do and went out and did it. I was one type in my
department and there were others.” Another arts and humanities professor described himself as a maverick in his field. Finally, a natural scientist linked entrepreneurial behavior and creativity when he said, “When I think of entrepreneurship, I think of it not just as going out and making a lot money. I think of it in terms of those skills that allow you to turn your dreams into something real. I believe entrepreneurship is a form of empowerment and encourages people to obtain the resources they need to succeed and to pursue their creative aspirations.”

Summary

This case study research advanced arguments concerning the many complex influences upon the work of individual faculty members. The study emphasized the ability of skilled and knowledgeable faculty members to attend to environmental cues for optimal work performance, but recognized the constraints that disciplines and organizational context place upon the individual. The guiding conceptual framework that suggested the interaction of multiple influences in the categories of individual behaviors, organizational behaviors, and disciplinary influences was helpful in organizing the study, and the results contributed confirmatory evidence on the viability of the conceptual framework for understanding the topic of entrepreneurship. Moreover, the cases highlighted the ability of an individual professor, with talent, knowledge, skill, motivation, awareness of the multiple influences upon his or her work, and an entrepreneurial working style to exert some control over how work is conducted and perceived by knowledge domain representatives at the institutional and disciplinary levels.
As with creativity and leadership, entrepreneurial behaviors can be considered along a continuum. Entrepreneurial activity of professors may include an informal and personal dimension that requires probing and placement of activities in context to understand it, and it may also include expressions of behaviors that have a broader common appeal. The perspective that emerged from the study of this institution was that academic entrepreneurship is more than a set of narrowly focused work products. The study demonstrated that academic entrepreneurship is also a general style of work that emphasized creative approaches to negotiating work environments and faculty vitality. This expanded conceptualization of academic entrepreneurship could help academic policy makers and individual professors, including individuals in departments who may view academic entrepreneurship narrowly and skeptically, to recognize that while all aspects of academic entrepreneurship may not apply for a given academic context or necessarily be encouraged, entrepreneurial attitude and style is a phenomenon that is valued and cultivated in all of the fields and disciplines represented in a Faculty of Arts and Sciences although not universally realized.
References


*Journal of Creative Behavior, 24*(4), 256-274.


June 29, 2001

Dear Dean:______:

I am a doctoral candidate within the Educational Policy, Planning and Leadership (Higher Education Emphasis) Program within the School of Education at the College of William and Mary. The purpose of this letter is to request assistance from you and representatives of the arts and sciences faculty at _______ for a pilot study of an exploratory multiple case study dissertation. I would appreciate the opportunity to meet with you to explain my proposed study, and to obtain your authorization to conduct this pilot study with _______ arts and sciences faculty as the primary data source. In addition, I would like for you to suggest individual faculty members for me to contact to participate in the pilot study.

The purpose of the study would be to examine the working styles of nominated academic entrepreneurs, and the working conditions they encounter that enhance or inhibit their work. My understanding of the topic has been informed by a literature review in the areas of business entrepreneurship, innovation and creativity within individuals and organizations, as well as by entrepreneurship in an academic context.

A proposal summary sheet describing the key elements of my proposed dissertation study is enclosed. Also enclosed is a diagram of a conceptual model I am using in my approach to understanding the multiple influences upon academic entrepreneurship. Since an important part of this study would include nomination of academic entrepreneurs by you, and by two other academic administrators, I have also included guidelines for nomination of potential professors to participate in the study. Regarding the total number of pilot study participants, I would like to interview approximately 5 nominated entrepreneurs, and a total of 2-3 individuals whom the nominated entrepreneurs suggest have influenced their entrepreneurial working style. All of the study participants, including influencing individuals would also be asked to complete a questionnaire. An additional component of the pilot study includes collection and analysis of ___________documents, generally public documents or at least documents with a wide distribution to _______ arts and sciences audiences. The documents I review will be documents that may help me understand the culture and climate within _______ arts and sciences and _______ generally.

I will call you to follow-up to my request. Please contact me at 757-220-8780 with questions about my proposed dissertation pilot study. If you prefer, you may contact, Joyce VanTassel-Baska, Chair of my dissertation committee (757-221-2185). Thank you for considering my request.

Sincerely,

Ron Hunt
Doctoral Candidate

Enclosures
Appendix B: Guidelines for Nomination of Study Participants

Guidelines for Nomination of Study Participants

1. Please provide me with the names of at least three faculty members within each of three broad areas of Faculty of Arts and Sciences – natural sciences, social sciences, and humanities who frequently express attributes, qualities and behaviors that can be associated with both entrepreneurship in an academic context and practices commonly associated with individuals who may be regarded as highly entrepreneurial, innovative, and creative.

2. The following page includes two lists to assist you in developing your list of individuals for me to contact. List A includes a listing of attributes, qualities, and behaviors commonly associated with business entrepreneurs, innovators, and/or creative individuals. List B includes specific behaviors of professors that are often considered entrepreneurial in certain contexts. Please use both lists as a guide in nominating academic entrepreneurs.

3. These are guidelines only. Any one individual will not express all of these qualities, behaviors, and attributes. Also, individuals whom you may not consider as being entrepreneurial may well express many of the qualities. In developing your list you may also draw from your own understanding of qualities you believe an academic entrepreneur expresses. I am broadly defining academic entrepreneurship to include both a working style as well as single or multiple categories of work products that are commonly referred to as entrepreneurial in an academic context.

4. When providing me your list of nominated entrepreneurs, please provide a brief statement concerning the most important basis upon which you decided to nominate each individual for participation in my pilot study (e.g. highly productive, extensive consulting activity, patenting and licensing, started own business, innovative teaching methodology, developed an institute or center, or multiple categories of behaviors fitting my guidelines of an academic entrepreneur). If your primary reasons for nominating an individual as an academic entrepreneur are not listed as common attributes of entrepreneurs that I provide, please note those reasons as well.
LIST A -- GENERAL BEHAVIORS, ATTRIBUTES, QUALITIES COMMONLY ASSOCIATED WITH ENTREPRENEURS, INNOVATORS, AND CREATIVE INDIVIDUALS

1. Ability to recognize and capitalize upon emerging opportunities (forward thinking).

2. High degree of sensitivity to internal and external environments.

3. Action and goal oriented.

4. Willingness to accept calculated risks.

5. High degree of intrinsic motivation.

6. Possessing special knowledge of technologies, processes, products, markets, or systems – disciplinary competency.

7. Strong drive to succeed that may be expressed in a desire for financial gain from entrepreneurial behaviors, professional success and recognition, and/or advancing knowledge.

8. Ability to overcome complex challenges of creating a new organizational structure.

LIST B -- BEHAVIORS OF ACADEMICS THAT ARE COMMONLY REFERRED TO AS ENTREPRENEURIAL

1. Consistent unconventional, innovative and creative approaches to research, teaching, and service – willing to break the mold.

2. Demonstrated track record of academic productivity – both quantity and quality – that is consistently above departmental or disciplinary norms.

3. Exceptional ability with respect to obtaining individual, departmental and/or institutional resources – sensitivity to market forces affecting allocation of resources. Large scale grants and contracts work.

4. Commercializing ideas through relationships with business and industry (contracts, patents, copyrights, trademarks, royalties, licensing)

5. Starting and operating a business as a result of an invention, process, or idea.

6. Active engagement in earning supplemental income as a consultant to business, industry, government, non-profit organizations, and other types of organizations.

7. Establishing and managing an academic program, center, institute or other organizational entity.

8. Collaborative arrangements with faculty on cross-disciplinary projects and participation in academic consortia and partnerships.

9. Developing and/or early adoption of novel instructional technologies.
Appendix C: Letter to Study Participants

RONALD M. HUNT
3013 Pine Hollow Path
Williamsburg, VA 23185
757-220-8780

November 5, 2001

Dear Nominated Academic Entrepreneur:

I am a doctoral candidate within the Educational Policy, Planning and Leadership (Higher Education Emphasis) Program within the School of Education at the College of William and Mary. The purpose of this letter is to request your assistance with an exploratory mixed design dissertation study. The working title of my dissertation is "An Exploratory Study of Entrepreneurial Arts and Sciences Faculty in the Context of their Work Environments". You were nominated by an academic administrator at ____________ as an individual who expresses either a general working style or specific work behaviors that may be associated with academic entrepreneurship.

The purpose of my dissertation is to examine the working styles of nominated academic entrepreneurs, and the working conditions they encounter that enhance or inhibit their work. My understanding of the topic has been informed by a literature review in the areas of business entrepreneurship, innovation and creativity within individuals and organizations, as well as by entrepreneurship in an academic context. I have conducted pilot research on the topic that included interviews with faculty members within the arts and sciences division at a highly selective university.

Your participation would involve completing the enclosed questionnaire, providing me with a copy of your curriculum vitae, and allowing me to interview you for approximately one-hour. I understand the many demands upon your time, and assure you that if you agree to participate, I will attempt to collect data quickly and efficiently to limit your time commitment. I would like to conduct the interviews between November 12 and December 12, 2001. Several items are enclosed for your review and response. The items include Participant Instructions, Informed Consent form, Nominated Academic Entrepreneur Questionnaire, Authorization to Tape Record form, and Tentative Interview Date form.

I will call you to follow-up to my request. Please contact me at 757-220-8780 or by electronic mail (ronmhunt@msn.com) with questions about my request for your participation in my dissertation study. If you prefer, you may contact Joyce Van Tassel-Baska, Chair of my dissertation committee (757-221-2185). Thank you for considering my request.

Sincerely,

Ron Hunt
Doctoral Candidate

Enclosures
Appendix D: Participant Instructions

PARTICIPANT INSTRUCTIONS -- NOMINATED ACADEMIC ENTREPRENEUR

1. Please complete the enclosed Informed Consent Form.

2. Please answer the questions on the enclosed Nominated Academic Entrepreneur Questionnaire. Some of the questions simply require you to choose among response options. Other questions ask you to provide short answers, typically one or two sentences in length.

3. Concerning depth of your response for the questionnaire, I understand the many demands on your time, and as such have designed the questionnaire to be completed in approximately 30 minutes. You will be given an opportunity to elaborate on some of the topics included in the questionnaire during the interview portion of this study.

4. I respect your confidentiality in providing me information concerning your working style and perceptions concerning aspects of the working conditions that facilitate or inhibit your work. Since this research is primarily exploratory qualitative case study research, I need your name on the questionnaire so that I can use your questionnaire responses in preparing for the interview portion of this study. Information that you provide may be discussed with my dissertation committee members and may be attributable to you. However, formal reporting of information that you provide in my dissertation will not reference you or _________ by name. I will request your authorization for inclusion in the final dissertation of direct quotations or other information that may be attributable to you.

5. Please provide me with a copy of your most recent curriculum vitae (C.V.). Obtaining your C.V. prior to my interview with you will assist me in planning the interview.

6. Review and sign the Tape Recording Authorization Form indicating whether you will allow me to tape record my interview with you.

7. On the attached form labeled Tentative Interview Dates, please indicate three dates and times in which it would be convenient for me to interview you during the time period of November 12 and December 12, 2001.

8. After you have completed the Nominated Academic Entrepreneur Questionnaire, Informed Consent Form, Tape Recording Authorization Form, Tentative Interview Date Form, and printed a copy of your curriculum vitae, please send me an email message (ronmhunt@msn.com) notifying me.

9. If you prefer to respond to the Questionnaire using electronic mail, please send me an email message indicating that preference. I will send you a copy of the questionnaire through electronic mail. Please respond to me at the following email address: ronmhunt@msn.com.

10. After receiving your study participant materials, I will contact you to arrange an interview with you in your office or at a convenient location for you.

11. Please contact me at 757-220-8780 if you have any questions about your participation in this study.

Thank you for making a valuable contribution to my dissertation study.

RONALD M. HUNT
3013 Pine Hollow Path
Williamsburg, VA 23185
757-220-8780
TENTATIVE INTERVIEW DATES

In order to facilitate picking one date for me to interview you, please list at least three dates, including your time preference. If it is more convenient for you, I am willing to meet with you before or after regular business hours. Please list dates between November 12th and December 12th.

1st choice: _______________________________________________

2nd choice: _______________________________________________

3rd choice: _______________________________________________

Nominated Academic Entrepreneur Participant Name
INFORMED CONSENT FORM

Dear Study Participant:

Thank you for agreeing to participate in this study. The study is in partial fulfillment of a dissertation requirement within the Educational Policy, Planning, and Leadership (Higher Education Emphasis) program of the School of Education at the College of William and Mary.

The purpose of my dissertation is to examine how faculty members nominated as expressing behaviors that may be described as entrepreneurial negotiate and shape their work environments to enhance their work performance within three academic areas of Arts and Sciences faculty – natural sciences, social sciences and humanities. I am also interested in understanding how work environmental factors may enhance or inhibit entrepreneurial behaviors. Furthermore, I am interested in examining how the predominant entrepreneurial behaviors may vary by disciplinary areas.

Concerning your participation in this project, please note the following:

♦ I intend to fully inform you concerning the purposes of my dissertation.

♦ You may terminate your participation in this study at any time.

♦ You may refuse to respond to any specific questions.

♦ The data that I report for this project will not identify you by name or by institution.

♦ It would be very valuable to me in analyzing interview responses, if you allow me to tape record my interview with you. Please sign the attached form if you agree to allow me to tape record the interview.

♦ If you have any questions about your participation in this study, please direct them to me at (757) 220-8780 or to my dissertation Chair, Joyce VanTassel-Baska, (757) 221-2185.

Please sign below to indicate that you have read this informed consent statement and agree to participate in my dissertation study. Thank you for your assistance.

________________________________________  __________________________
STUDY PARTICIPANT                                      DATE
Appendix F: Permission to Tape Record Interview Form

AUTHORIZATION TO TAPE RECORD INTERVIEW

Please check below indicating whether you will allow me to tape record the interview. I would like to use review of the tape recording as an important part of the data analysis for this study.

_____ Yes, I give you my authorization to tape record the interview.

_____ No, please do not tape record the interview.

________________________________________
STUDY PARTICIPANT SIGNATURE
Appendix G: Questionnaire
(Collapsed Version)

NOMINATED ACADEMIC ENTREPRENEUR
QUESTIONNAIRE

Name:_____________________________________________________
Title:_____________________________________________________
Telephone:_________________________________________________
E-mail address:_____________________________________________
Fax: ______________________________________________________
Date began current position:___________________________________
Previous positions held at this institution:_________________________
Date questionnaire completed: _________________________________

1. Please list the primary topics on which you teach, write, research, consult, and produce other creative works.

2. What are the approximate percentages of time that you spend during a typical week on:
(Total percentages should equal 100 percent)

____ teaching (including class preparation and student advising)
____ research
____ service
____ other major activity (please indicate type)

3. List briefly and generally important demands on your time outside of work (e.g. civic involvement, significant leisure interest or avocation, family responsibilities)?

4. Please indicate your preferences concerning your working style in each of the following areas. Please check all that apply in each category and provide a brief explanation.

a. Preferences for working time:

____ Early morning hours
____ Standard working hours
____ Evening hours
b. Preferences for place of work:

- Office
- Home office
- Field project location
- Studio
- Laboratory
- Depends on type of project
- Other (please list):

Brief explanation:

c. Preferences for routine or flexible working style:

- Well-established structures and routines
- Flexible or adaptable approach that helps me respond to changing priorities
- Depends on nature of project or activity

Brief explanation:

d. Preferences concerning collaborating with other people and solitary work:

- Nature of discipline requires substantial solitary work
- Nature of discipline requires extensive collaborative work
- Prefer a working style that combines collaborative projects and solitary work
- Depends on nature of project or activity

Brief explanation:

e. Preferences concerning pace and intensity of work:

- Prefer to focus on a limited number of projects
- Comfortable juggling multiple projects and activities simultaneously
- Prefer a pace that allows for substantial time for reflection and project revision
- Prefer a fast-paced environment requiring quick decisions
- Deadlines serve as a motivating factor and enhance performance
- Prefer to set own time schedules for projects
- Other (please list):

Brief explanation:

5. Please list any attributes of your working style or personal habits, not already listed or explained in your response to the previous question, that you have developed to facilitate your best work (e.g. exchanging ideas at professional and/or social events, retreats,
sabbaticals, time for reflection and incubation of ideas, exercise routines, shaping of your work space, rest, talking with individuals from other disciplines).

6. What do you do, if anything, to actively promote or market your ideas?

7. Please summarize attributes of your working style that may help you overcome obstacles or less than optimal working conditions to accomplish your goals.

8. Please list at least five adjectives that you believe could be used to describe your working style?

9. Below is a listing of statements of working conditions that may exist within academic work environments. Please indicate your perception of the working conditions you are currently experiencing by placing the response option number that most closely reflects your opinion in the space next to each statement.

   1. Strongly agree
   2. Agree
   3. Neutral
   4. Somewhat disagree
   5. Strongly disagree
   6. Undecided

   ___ Flexible enforcement of policies and procedures
   ___ Organizational structures with limited bureaucratic constraints
   ___ Freedom and autonomy concerning work processes
   ___ Encouragement and sufficient time to pursue intrinsically interesting tasks
   ___ High degree of challenging work with adequate levels of support
   ___ Manageable teaching load
   ___ Positive departmental morale
   ___ Positive institutional morale
   ___ Positive disciplinary morale
   ___ Minimal negative departmental politics
   ___ Minimal negative institutional politics
   ___ Minimal negative disciplinary politics
   ___ Overall high quality of facilities
   ___ Encouragement of inter-disciplinary work
   ___ Adequate student and support staff resources
   ___ Climate that highly values entrepreneurial behaviors
   ___ Funding for projects
   ___ Support from departmental staff and/or central administrators in obtaining resources
   ___ Financial rewards for entrepreneurial behaviors
   ___ Other rewards for entrepreneurial behaviors
   ___ Supportive leadership (dean and/or department chair)
   ___ Released time for research or other non-teaching activities
   ___ Availability of sabbatical opportunities
   ___ Overall fair intellectual property policies that encourage entrepreneurial behaviors
   ___ Overall fair conflict of interest policies that encourage entrepreneurial behaviors

10. Are there aspects of your academic work environment, not included on the list in question 9, that influence your engagement in entrepreneurial behaviors. If so, please list.
11. Please comment on several of those conditions from the list in Question 9 in which you either responded strongly agree, or strongly disagree, or from your list in question 10.

12. Do you believe there is an expectation to be entrepreneurial within your academic department? Please explain.

13. Briefly describe some of the most valued categories of work products within your knowledge field (e.g. work products that may be important for promotion and/or institutional and disciplinary recognition such as books, journal articles, sponsored research, inventions, patents, scientific discoveries, performances, consulting).

14. Does your academic work involve substantial inter-disciplinary work? If so, in what way? Please list disciplines, fields or subspecialties that influence your work.

15. Please list important organizations or categories of individuals who are important influences in determining work that may be widely accepted as creative or otherwise valuable to your field (e.g. professional associations, important journals, government agencies, or other organizations influencing acceptance of creative work).

16. Does your work frequently generate interest outside of specialists within your field? (e.g. popular local or national media, campus publications) Please explain.

17. Please indicate your level of participation in the activities listed below by placing the number that corresponds with the following response options.

   1. Frequently
   2. Occasionally
   3. Have done so on at least one occasion
   4. Never
   5. Undecided

   - Starting and operating a center, institute or other type of organizational unit
   - Active engagement in obtaining resources for your work through grants and contracts
   - Early adoption of new instructional technologies
   - Development of novel instructional technologies
   - General entrepreneurial working style
   - Academic productivity that is above departmental norms
   - Academic productivity that is above institutional norms
   - Academic productivity that is above disciplinary norms
   - Participation in inter-disciplinary projects
   - Earning royalty income
   - Contracting with or licensing technology to business, industry and other organizations
   - Obtaining patents and trademarks
   - Earning consulting income
   - Obtaining copyright protection on intellectual property
   - Establishing and operating a business

18. Briefly explain why you believe you were nominated as an individual who engages in behaviors that may represent attributes or behaviors of an academic entrepreneur? In
your response please consider your general working style, specific categories of behaviors such as those listed above, and general academic productivity.

19. Please indicate your level of agreement with the following statements concerning why you may engage in behaviors that could be labeled as entrepreneurial. Place the response option number in the space next to each statement.

1. Strongly agree
2. Agree
3. Neutral
4. Somewhat disagree
5. Strongly disagree
6. Undecided

___ Intrinsic interest in topic leads logically to activities that may be described as entrepreneurial
___ Required by academic department for promotion and tenure
___ Required by disciplinary field for scholarly recognition
___ Necessary to obtain resources to advance work
___ Provides supplemental income
___ Complements research
___ Complements teaching
___ Complements service
___ Enhances prestige and standing within field and department
___ Helps maintain professional faculty vitality

20. It would be helpful for me to talk with an individual who has had some influence on your working style, either positive or negative, or who is simply very familiar with your general working style or current work environment. This person may be from ____________, or some other work or personal context. The types of individuals that you may recommend could include a trusted colleague, a dean or department chair, a current or former mentor, a former teacher, relative, or a close friend. If you approve of my contacting an individual about your working style, please list the name, telephone number and email address of one or two individuals in the space provided below. I will contact one individual for a telephone or in person interview, and ask the same individual to complete a preliminary questionnaire.

Name, Telephone Number, and Email Address of Influencing Individual

Name, Telephone Number, and Email Address of Influencing Individual

If you prefer that I not contact anyone about your working style, please provide a brief explanation of some of the important ways that a particular individual has influenced your working style. In providing your explanation, it is not necessary to reference the individual’s name, but please reference your relationship to the individual (e.g. colleague, relative, dean, mentor, etc.). In our interview session, I may ask you to elaborate on your brief explanation.
THANK YOU FOR COMPLETING THIS QUESTIONNAIRE

I will contact you to make arrangements to obtain the following Participant Materials:

_____ Nominated Academic Entrepreneur Questionnaire
_____ Informed Consent Form
_____ Copy of your most recent Curriculum Vitae
_____ Authorization to Tape Record Interview Form
_____ Tentative Interview Date Form

Ron Hunt
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Appendix H: Interview Protocol

NOMINATED ACADEMIC ENTREPRENEUR -- INTERVIEW PROTOCOL

PRELIMINARY INFORMATION

DISSERTATION TITLE:
An Exploratory Study of Entrepreneurial Arts and Sciences Faculty in the Context of Their Work Environments

NAME OF INTERVIEWEE: ________________________________

POSITION OF INTERVIEWEE: ________________________________

TIME OF INTERVIEW: ________________________________

DATE OF INTERVIEW: ________________________________

PLACE OF INTERVIEW: ________________________________

LENGTH OF INTERVIEW: ________________________________

Before asking questions, make the following statements:

- Thank you for participating in my dissertation study concerning academic entrepreneurship -- My approach to this topic has been informed by a review of literature in several areas -- business and organizational entrepreneurship, higher education context for entrepreneurship, and enhancements and inhibitors to innovation, and creativity for individuals and organizations. For this study I am interested in how highly entrepreneurial faculty members negotiate their work environments. I am interested in your working style as well as important influences upon your working style such as departmental and institutional characteristics as well as unique aspects your knowledge area, including important influences upon your disciplinary field.

- Many of the questions I will ask you today were developed to provide you with an opportunity to elaborate on the information you provided in the questionnaire. The questions are divided into three broad categories: 1) Your individual working style; 2) Departmental and institutional influences upon your working style and 3) Knowledge domain influences upon your working style.

I received a copy of your completed informed consent form. I would like to remind you that you may stop your participation in the study at any time. Also, I do not intend to list you by name or institution in any publication that may result from this study. I will provide you with a copy of dissertation text that may be attributable to you for your review and comment to ensure accuracy.
Because of the nature of your work, there is a possibility that information may be attributable to you despite anonymity with respect to your name and institutional name. If that is the case, I will seek your authorization before including information that may reveal your identity.

- You indicated that you would allow me to tape record the interview. If that is still agreeable to you, may I begin recording this interview session?

- Are you ready to begin answering questions?

INTERVIEW QUESTIONS

INDIVIDUAL WORKING STYLE

1. Please tell me about a typical work week with emphasis on aspects of your general working style? (Probes: categories of projects/activities; setting goals; prioritizing projects; managing time; working alone versus working with others; routines versus flexible style; tracking projects; providing leadership; relationship networks; intensity; pace; handling distractions; idea incubation; time and place of work; identifying opportunities)

2. Please describe some of the working conditions in which you are most creative and productive? (Probes: time of day; place for working; organizing office, home office, laboratory, studio or other working space; unique working habits; incubation of ideas)

3. Please provide an example of a project in which you may have expressed an entrepreneurial, creative, and/or innovative approach to your work? (ask for a second example if the first example does not include a lot of details)

4. What aspects of your work may be described as entrepreneurial and why? (Probes: why nominated as entrepreneur; unconventional, creative, innovative teaching, research, service; productive above disciplinary and departmental norms; commercializing ideas, consulting; other aspects of entrepreneurial behaviors; focused high energy level and intrinsic interest relating to topic area)

5. When pursuing activities that may be entrepreneurial, are there some faculty functions or responsibilities in which you must devote less attention? Please explain. (Probes: governance, service, research, teaching, student advising, family, leisure, or entrepreneurial activities are complementary)

6. Please tell me about how you negotiate obstacles to accomplish your goals? (Probes: rules, policies, procedures, time constraints, resource constraints)

DEPARTMENTAL AND ORGANIZATIONAL CLIMATE

What do you need from academic administrators and central administration to perform your work effectively?

7. What institutional and departmental conditions facilitate your work? Please give specific examples. (Probes: emphasis on entrepreneurial aspects of work, policies, procedures,
8. What institutional and departmental conditions may inhibit your work? Please give specific examples. (Probes: emphasis on entrepreneurial aspects of work, policies, procedures, teaching loads, consulting policies, release time, outside employment restrictions, organizational structures, resources, facilities, climate, culture)

9. Do you encounter any criticism or risks relating to some of your entrepreneurial behaviors? Please explain. (Probes: relationships with colleagues/deans, effect on promotions, interference with other commitments)

KNOWLEDGE DOMAIN INFLUENCES

10. Please comment on one or two of the most powerful ideas that are influencing your thinking (Probes: ask for a second idea if limited response on first, theories, paradigms, ideas within and outside of their disciplinary field).

11. Please comment on major changes within your content area that may be shaping your approach to your work. (Probes: paradigm shifts; acceptance or encouragement of interdisciplinary work; debates within field; development of specialized equipment).

12. Please tell me about some of the most valued categories of work products within your knowledge field. (Probes: books, journal articles, sponsored research, inventions, patents, scientific discoveries, performances, consulting, other)

13. Does your disciplinary culture or knowledge area encourage entrepreneurial behaviors? Please explain. (Probes: compared to applied fields and other knowledge domains; response to change; acceptance of innovation).

14. Does your disciplinary culture or knowledge area discourage entrepreneurial behaviors in any way? Please explain. (Probes: compared to applied fields and other knowledge domains; conservatism of "judges and gatekeepers"; regulatory requirements of gatekeeping organizations such as funding agencies)

INTERVIEW WRAP-UP

- If agreeable to you, I may contact you by telephone or by email for clarification of observations you made in this interview.

- Thank you for participating in this interview and thank you for participating in my dissertation study.
Vita

Ronald Myers Hunt

Birthdate: November 6, 1959
Birthplace: Hampton, Virginia (have lived in Suffolk, Fairfax, and Williamsburg, VA)

Education:

1997-2002 The College of William and Mary
Williamsburg, Virginia
Doctor of Philosophy

1995-1997 The College of William and Mary
Williamsburg, Virginia
Master of Education

1978-1982 James Madison University
Harrisonburg, Virginia
Bachelor of Science

Selected Employment:

United States Senate
American Red Cross National Headquarters
The College of William and Mary
Consultant for education and human service organizations