ABSTRACT

Title of Dissertation:	THE TITHE: PUBLIC RESEARCH UNIVERSITY STEM FACULTY PERSPECTIVES ON SPONSORED RESEARCH INDIRECT COSTS
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This study sought to understand the phenomenon of faculty involvement in indirect cost under-recovery. The focus of the study was on public research university STEM (science, technology, engineering and mathematics) faculty, and their perspectives on, and behavior towards, a higher education fiscal policy. The explanatory scheme was derived from anthropological theory, and incorporated organizational culture, faculty socialization, and political bargaining models in the conceptual framework. This study drew on two key assumptions. The first assumption was that faculty understanding of, and behavior toward, indirect cost recovery represents values, beliefs, and choices drawn from the distinct professional socialization and distinct culture of faculty. The second assumption was that when faculty and institutional administrators are in conflict over indirect cost recovery, the

resultant formal administrative decision comes about through political bargaining over critical resources. The research design was a single site, qualitative case study with a focus on learning the meaning of the phenomenon as understood by the informants. In this study the informants were tenured and tenure track research university faculty in the STEM fields who were highly successful at obtaining Federal sponsored research funds, with individual sponsored research portfolios of at least one million dollars. The data consisted of 11 informant interviews, bolstered by documentary evidence.

The findings indicated that faculty socialization and organizational culture were the most dominant themes, while political bargaining emerged as significantly less prominent. Public research university STEM faculty are most concerned about the survival of their research programs and the discovery facilitated by their research programs. They resort to conjecture when confronted by the issue of indirect cost recovery. The findings direct institutional administrators to consider less emphasis on compliance and hierarchy when working with expert professionals such as science faculty. Instead a more effective focus might be on communication and clarity in budget processes and organizational decision-making, and a concentration on critical administrative support that can relieve faculty administrative burdens. For higher education researchers, the findings suggest that we need to create more sophisticated models to help us understand organizations dependent on expert professionals.

THE TITHE: PUBLIC RESEARCH UNIVERSITY STEM FACULTY PERSPECTIVES ON SPONSORED RESEARCH INDIRECT COSTS

By

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Dedication

This study is dedicated to my family.

To my parents, Norbert and Martha Gossman: Though you are gone, I am still blessed by the gift of your unconditional love. I think of you every day.

To my children, Anastasia Crihfield and Roy Crihfield: I can’t believe I began this journey 15 years ago, when you were 12 and 10 years old. Alongside the joy of watching you grow into such kind, smart, talented, interesting, and loving individuals, I have had the gift of your constant encouragement, ever cheering me on. Thank you for being in my life.

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Without the support and guidance of Noah Drezner this study would not have happened. Noah kindly took me on after the retirement of Frank Schmidtlein, my long-time advisor and champion. Equally, this study would not have happened without Frank's unswerving advocacy and willingness to critique many, many drafts. I can never express enough gratitude to you both. The generosity of expertise and time you both have shown me is a mark, in my opinion, of true scholars and mentors.

The same can be said of Betty Malen, who agreed to let me return to her classes nearly ten years after my initial foray. Betty never fails to offer rigor, challenge, enlightenment, and support, in her classes and with her students.

Sharon Fries-Britt was my instructor in the very first class I took in the Higher Education program 15 years ago. I was thrilled when she agreed to serve on my committee, and am grateful to her for agreeing to Co-Chair once Noah left for Columbia University and could no longer serve as Chair. Marvin Titus guided me through the intricacies of preparing a dissertation in the research critique seminar. I was equally thrilled when he agreed to join my committee.

I could not have asked for a better group to guide me on the final stages of this journey.

My only regret, besides the loss of my parents, is to have lost Bob Berdahl during the intervening years. Bob was my first advisor. I was amazed when Bob called me personally after I had been accepted to both the University of Virginia and the University of Maryland, and was weighing my choice. I didn't expect to hear

directly from the leader of the program at Maryland and a prominent scholar in the field. He disarmed me with his graciousness and advice. I chose Maryland and have never looked back.

Equally importantly, I have been blessed by having my posse accompany me this long way. Jenn Vest Frank and I became friends 14 years ago in the History of Higher Education class, and later, we were colleagues at the University System of Maryland. Stacey Bass joined us there while she was working on her Master's Degree in the program. We have commiserated, we have communed, and we have survived as a group many, many years of graduate education and higher education administration. My friends, your intelligence, your ironic sense of humor, and your camaraderie have sustained me in more ways than you can know. Thank you.

Finally, I must acknowledge my informants. A remarkable group of highly accomplished, highly successful scientists, they offered both their time and their insights without any question of immediate or personal benefit. They are also the true scholars, and the true leaders, in this amazing arena we call science.

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CHAPTER ONE: INTRODUCTION

For more than 50 years, American research universities have had agreements with United States Federal government agencies authorizing each research institution's rate of indirect cost recovery. Indirect cost recovery is the reimbursement of overhead costs incurred while conducting research for the Federal government and other entities. During the past 20 years the effective, or actual, rate of indirect cost recovery has been roughly half the negotiated rate. This difference translates into billions in annual lost revenue for institutions of higher education. The National Science Foundation reported public research universities lost $3.4 billion in unrecovered indirect costs in fiscal year 2010 (National Center for Science and Engineering Statistics, National Science Foundation, 2012). Much of that under-recovery is the result of sponsor-imposed restrictions on the allowable percentage of indirect cost recovery that can be applied to research funding. A portion of the under-recovery results from principal investigator (faculty) requests for a waiver of, or reduction in, indirect costs. At one public institution, an analysis of fiscal year 2011 data indicated that faculty indirect cost waiver requests, on $19.8 million of direct costs in Federal sponsored research, resulted in at least $6 million in lost indirect cost recovery. Record analysis showed the effective indirect cost recovery reduced from a potential of $7 million to $700,000 (AVP, personal communication, March 5, 2012).

This study seeks to understand the phenomenon of faculty involvement in indirect cost under-recovery. The focus of the study is on public research university STEM (science, technology, engineering and mathematics) faculty, and their perspectives on, and behavior towards, a higher education fiscal policy. I use an

explanatory scheme derived from anthropological theory, and incorporate organizational culture, faculty socialization and political bargaining models in the conceptual framework, a form of what Schram describes as "paradigmatic synthesis" (2003, p. 37). This study draws on two key assumptions. The first assumption is that faculty understanding of, and behavior toward, indirect cost recovery represents values, beliefs, and choices drawn from the distinct professional socialization and distinct culture of faculty. The second assumption is that when faculty and institutional administrators are in conflict over indirect cost recovery, the resultant formal administrative decision comes about through political bargaining over critical resources. These two assumptions draw upon the conceptual framework, positioning organizational culture as the phenomenon's context, faculty socialization as the phenomenon's content, and political bargaining as the phenomenon's contest. The interplay of context, content, and contest will be used to explain faculty attitudes and behavior towards indirect cost recovery, and their involvement in indirect cost under-recovery at public research universities.

The research design is a single site, qualitative case study with a focus on learning the meaning of the phenomenon as understood by the informants. In this study the informants are tenured and tenure track research university faculty in the STEM fields who are highly successful at obtaining Federal sponsored research funds.

Purpose of Study and Research Questions

This study seeks to understand the perspectives of public research university STEM faculty on indirect cost recovery, and to explain any faculty role in the failure of public research universities to fully recover indirect costs. Although the Federal funding

agency effect on indirect cost recovery is much greater than the faculty role, that effect is less shrouded in mystery and less easily challenged by individual institutions. The Federal government, as one National Institutes of Health official conveyed, should "buy research as it buys anything else, from the low bidder, so long as the quality is adequate" (Rosenzweig 1998, p. 7). The same can be said of non-Federal sponsors, from state agencies to private foundations. Indirect costs are less important to a sponsor than the direct costs necessary to conduct the research; consequently, when funding agency budgets are squeezed, indirect costs are a convenient target for reduction of costs on any particular sponsored research project.

If the rationale on the part of sponsors is understandable, what is the rationale on the part of faculty? Why would members of an institution seek fewer funds for their institution? For example, are these funds seen by research faculty as interchangeable, therefore, less indirect costs means more direct costs for the research project? The assumption in this study is that a complex set of factors may explain the faculty response to indirect cost recovery. Drawn from theoretical constructs that serve as structuring and sensitizing devices, these factors are rooted in three conceptual streams: organizational culture, faculty socialization, and political bargaining. Using a qualitative approach, with an emphasis on informant interviews, this case study will seek to understand the public research university STEM faculty perspective on, and behavior toward, indirect cost recovery on sponsored research.

The primary research questions are:

1. What is the public research university STEM faculty understanding of indirect costs?

2. What is the public research university STEM faculty behavior toward indirect costs?

The primary research questions reflect the science of anthropology and its ethnographic approach, which look to reveal human culture. Culture, as defined by Spradley (1979), is "the acquired knowledge that people use to interpret experience and generate social behavior" (p. 5). To understand culture, an ethnographer seeks informants who serve as teachers and guides to the informant's particular culture. In this case, public research university STEM faculty will be the informants and guides, and their own words will illuminate their interpretation of, and their actions toward, the phenomenon of indirect cost recovery on their sponsored research funding.

Wolcott notes, "Theory should facilitate the inquiry process" (2001, p. 78). This study draws on a theoretical framework to structure the inquiry and assemble the research design. The secondary research questions tether the phenomenon of faculty involvement with indirect cost recovery to the conceptual framework. That framework positions organizational culture as the context for the phenomenon, faculty socialization as the content of the phenomenon, and political bargaining as the contest in the phenomenon.

The secondary research questions are:

1. Does organizational culture/context help explain the public research university faculty understanding of and behavior toward indirect costs?

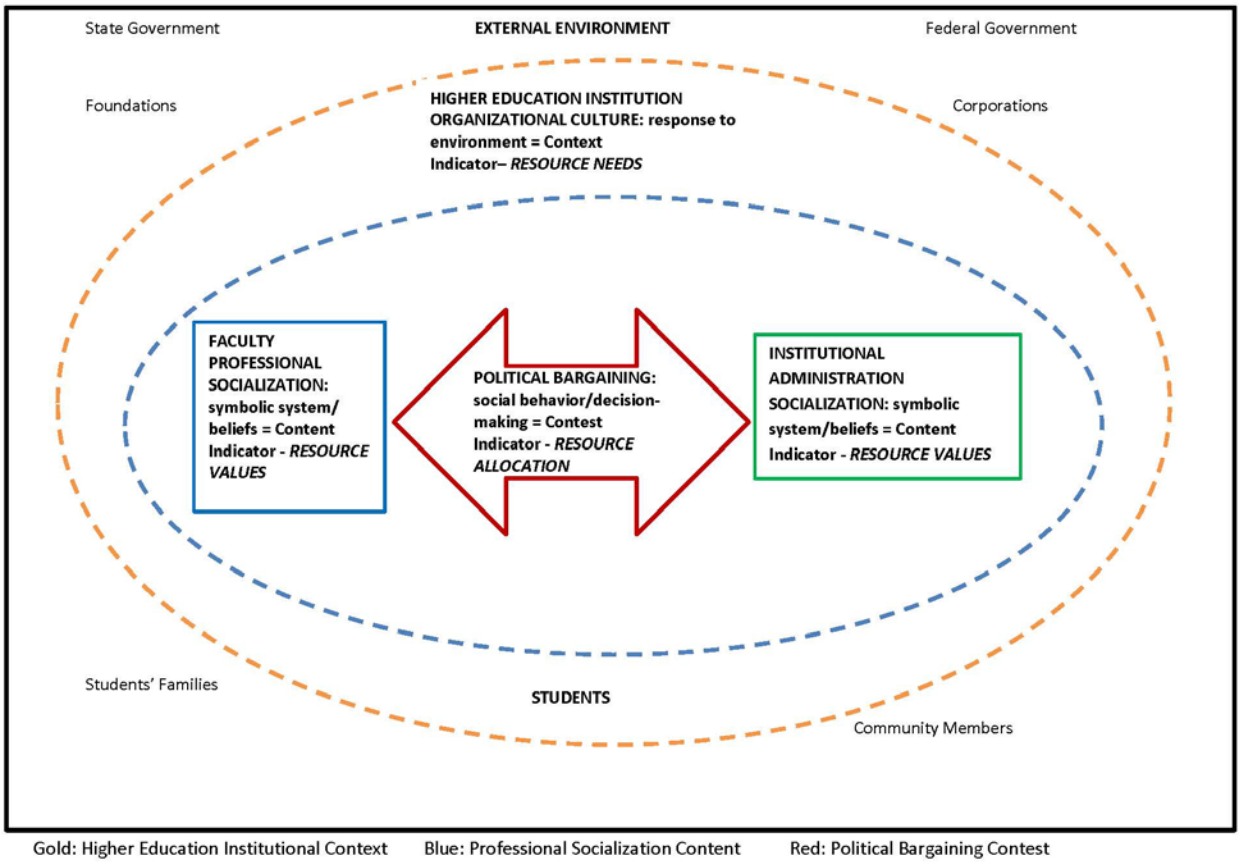
2. Does faculty socialization/content help explain the public research university faculty understanding of and behavior toward indirect costs?

3. Does political bargaining/contest help explain the public research university faculty understanding of and behavior toward indirect costs?

4. Do the factors of context, content, and contest intersect and interact so as to explain the public research university faculty response to indirect cost recovery on sponsored research projects?

Figure 1 shows the conceptual model, outlining the three conceptual streams of higher education organizational culture, faculty professional socialization, and political bargaining. Each of these conceptual streams has its own analytical theme, of context, content, and contest. Each of these conceptual streams includes key variables, which reflect the core elements of the concept. Each of these conceptual streams has an indicator, which serves to illuminate the phenomenon of faculty attitude and behavior toward indirect cost recovery. Resource needs are the indicator for the analytical theme of context, reflecting the organizational culture stream. Resource values are the indicator for the analytical theme of content, reflecting the faculty professional socialization stream. Resource allocation is the indicator for the analytical theme of contest, reflecting the political bargaining stream. I hope to find these indicators and key variables referenced by my informants when they discuss their understanding of indirect cost recovery, and their actions regarding indirect cost recovery.

Figure 1. Conceptual Model



This study is an attempt to begin to understand the differing perspectives between faculty and administrators over indirect cost recovery. For the sake of public higher education's endangered research enterprise, the need could not be greater. Competition for research funding has intensified dramatically over the course of the past 20 years (National Research Council, 2014), grant proposal success rates have declined (National Institutes of Health, 2012), and a dwindling set of tenured and tenure-track research faculty find their research programs under greater pressure to perform with

fewer resources (National Science Board, 2012). If administrators and faculty can begin to speak across the divide, perhaps institutions can more fully ascertain what steps are needed to achieve successful indirect cost recovery.

The following section describes the genesis of the indirect costs issue in Federal government research funding for higher education. The history of indirect cost recovery is outlined, as well as its effect on public institutions of higher education. This background provides fundamental information for exploring the phenomenon's context.

Issue Background: History and Function of Indirect Cost Recovery

The history of significant sponsored research funding in higher education begins with the enormous increase in U.S. Federal government research initiatives during and immediately after World War II, and continues to this day with the dominance of the National Institutes of Health ($35 billion in FY11 sponsored research funding), the National Science Foundation ($8 billion in FY11 sponsored research funding) and the other 24 grant-making and contract distributing divisions of Federal agencies (Geiger, 1986; 1993; 2004; Office of Management and Budget, 2011). In addition to the Federal government, state governments, non-profit groups, and for-profit entities also provide sponsored research support.

Major research universities long battled with the Federal government to ensure that their underlying costs for administering research were covered as part of the Federal government funding. Higher education institutions demanded that the buildings, maintenance, equipment, training, and administrative support for the research enterprise be factored into the costs of conducting successful research. For-profit entities obtaining

Federal government funding automatically include “overhead” and “fees” in their total costs. As non-profit entities, however, all higher education institutions must present a detailed cost analysis in their request for coverage of their baseline expenses, in order to ensure no profit will be made from the Federal government funds. Specific cost principles for non-profit entities receiving Federal funds were outlined in the first issuance of the Office of Management and Budget’s Circular A-21 in 1958, detailing the basic principles for cost recovery on sponsored research projects by higher education institutions and other non-profits. Subsequently, over the course of the past 50 years, the implementation and modification of A-21 has resulted in a complex process of assessment by Federal agencies, primarily the Department of Health and Human Services and the Office of Naval Research (Council on Government Relations, 2008). These two agencies regularly assess the volume of research conducted and the resources required by more than 300 colleges and universities, and then use those assessments to determine a reasonable rate of indirect or overhead costs that can be applied to sponsored research funds for each institution. This rate is more formally known as the F&A (Facilities & Administrative) rate.

These Federal agencies, particularly the Department of Health and Human Services and the Office of Naval Research, as previously noted, and the Office of the President, through the Office of Management and Budget (OMB), are the critical parties in setting the parameters of indirect cost recovery on sponsored research. The OMB Circulars (A-21 for cost principles, A-110 for administrative requirements, and A-133 for audit) established the guidelines used by educational institutions and other non-profits for managing and accounting for the true costs of basic research. A handful of

studies exist on the use of F&A in sponsored research at higher education institutions, particularly the RAND study of 2000 (Goldman, 2000) and the Executive Office of the President, Office of Science and Technology Policy's report of the same year (2000). Both studies noted that the cap on the administrative portion of the F&A rate at 26 %, imposed in 1991, has adversely affected research universities' recovery of the true cost of conducting sponsored research. Until recently, little had changed since these reports were issued more than a decade ago. However, in 2011 the Office of Management and Budget proposed a review of A-21 and the other Circulars, and subsequently posted a notice of proposed changes in the Federal Register, in February 2012. Among the recommendations of the A-21 Task Force at that time was the need to reduce administrative burden, compensate higher education institutions for their actual costs in conducting sponsored research, and ensure compliance in responsibly managing Federal funds (Office of Extramural Research, National Institutes of Health, 2012). The OMB completed its review and in December 2013 published its decisions regarding the now consolidated Circulars, known as the Uniform Guidance (codified as 2 CFR, Part 200). The 759 page final guidance implements reforms applicable to Federal grants, contracts and cooperative agreements, and essentially leaves the current system of indirect (F&A) recovery in place for higher education institutions, while increasing several compliance and oversight obligations such as sub-recipient monitoring, conflict of interest, and performance management (Council on Financial Assistance Reform, COFAR, 2014).

The goal of the Federal agencies, and the White House Office of Management and Budget, in implementing reforms to the process of awarding Federal assistance to higher education institutions, and other entities, is to ensure the most effective and

appropriate use of Federal funds. Consequently, Federal oversight and compliance requirements have grown significantly for recipients of Federal funds. Meanwhile, as state support of public higher education has shrunk dramatically in the past decade, many public research universities increasingly rely on this external support to make up the difference in their operating budgets (State Higher Education Executive Officers (SHEEO), 2010; National Science Board, 2012). Therefore, even as higher education's dependency on external support has increased, so has the administrative burden that accompanies it.

External or extramural support is an umbrella term used for all revenue that is not state appropriated, or based on tuition or fees (Barr, 2002). Currently, external support represents between 25% and 30% of the annual revenue for the majority of public doctoral research universities (SHEEO, 2010; Chronicle of Higher Education, June 3, 2010). Of that total, sponsored research typically represents 70-80% of external funding, with private giving (handled by development or major gifts offices) representing the remainder. Sponsored research, the external non-gift funding to support research, training, service and fellowships, thus is the major component of external support. Sponsored research funding includes direct costs to conduct the projects, and indirect costs underwritten by the institution to support the research infrastructure. Public research institutions count on the recovery of these indirect costs in order to maintain their research programs, as the majority of such research is underwritten and paid for by the institution upfront and only reimbursed after the fact (COGR, 2008). All such research projects, therefore, are conducted at some risk to the institution. However, despite the existence of formal indirect cost recovery rates negotiated between every

major research university and the Federal Government, public research universities are unable to recoup their full costs. This discrepancy translates into billions in lost revenue. A recent National Science Foundation Higher Education Research and Development (HERD) Survey put the amount of unrecovered indirect costs for higher education at $4.6 billion, with $3.4 billion of that coming from public institutions (National Center for Science and Engineering Statistics, National Science Foundation, 2012). This issue affects the financial well-being of all research universities.

A disconnect between faculty and institutional understanding of indirect costs became clear when Congress passed the Murtha Amendment as part of the Department of Defense Fiscal Year 2008 (FY08) budget. This amendment, incorporated by the late Representative John Murtha of Pennsylvania, was attached to the FY08 Defense Appropriation Act and capped the rate of indirect costs applied to Defense Department basic research funds. The reported reason for this cap was a research university principal investigator's complaint to Representative Murtha that his project was hampered by the huge portion of costs "taken away by the F&A" (Association of American Universities, 2007, p. 26). According to the House Committee Report, this testimony led Representative Murtha and the Committee to determine that "the percent of basic research funding allocated to ...research organization's overhead costs has grown to unwarranted levels" (AAU 2007a; Brainard, August 6, 2007). Applying a cap of 35% on basic and applied research funds from the Department of Defense affected every major research university in the country, as the Department of Defense provides the majority of non-biomedical Federal research funds in engineering and technology, along with significant funding of other STEM fields (science, technology, engineering and

mathematics). Research universities across the nation immediately protested the proposed amendment and continued their protests once the amendment was enacted. The fact that such a dramatic impact on the fiscal security of research universities could occur, reportedly because of the unhappiness of one faculty researcher, is one impetus for this case study. While conceivable that external sponsors may have a vested interest in getting the most effective sponsored research project for the least overall cost, why would a sponsored project principal investigator want fewer funds in total coming to his or her institution? Does this episode reflect research faculty attitudes to indirect costs in general? The next section sets the context for this issue at public research universities.

The Role of Indirect Costs for Public Research Universities

In this section, I explore both the role of indirect cost recovery as a source of revenue and its impact on, and significance for, the fiscal health of public research universities.

Reliance

As state appropriations for higher education have shrunk and tuition revenue is frequently capped, public research universities are finding themselves increasingly financially dependent on external sponsored research support and its related indirect cost recovery. At public research universities, on average, sponsored research represents 25% of revenue support, with the remainder coming from tuition (23%) and state appropriations (17%). Auxiliary enterprises (such as bookstores) at 17% and private gifts at 11%, along with a mix of other revenues at 7%, make up the balance (Council on Government Relations (COGR), 2014; State Higher Education Executive Officers

(SHEEO), 2010). This revenue mix now nearly matches that of private research universities, where the economic importance of sponsored research has long been acknowledged. For private research universities, sponsored research represents 28% of revenue support, with the remainder coming from tuition (24%) and private gifts (23%). Auxiliary enterprises provide 16% of revenue for privates, along with a mix of other revenues at 9% (Council on Government Relations (COGR), 2014; State Higher Education Executive Officers (SHEEO), 2010).

Despite their increasing dependence on government sponsored research funding and the concomitant indirect cost recovery, public research universities do not reclaim the full costs of their sponsored research enterprise. Nationwide the average negotiated indirect cost rate for a public research university is 52%; the average effective (actual) rate of recovery (reimbursement) for these same institutions is 27% (COGR, 2014). In fiscal year 2010 alone, public research universities reported billions in unrecovered indirect costs, and at a rate higher than that reported by private universities (National Center for Science and Engineering Statistics, National Science Foundation, 2012). Critical factors underlying the difference between the negotiated and the effective rate of recovery for indirect costs are: 1) Congressionally mandated caps on recovery through appropriations and statutory language; 2) exclusions incorporated into the Office of Management and Budget Circular A-21, such as the prohibition on applying indirect costs to tuition or fellowships and the cap on administrative costs; and 3) internal institutional waivers on indirect costs requested by faculty for individual projects. Also, as indirect recovery is dependent on expenditures, annual recovery can be limited by under-spending on award budgets. For example, an institution with a 50% indirect cost

rate will recover $25,000 on every $50,000 of sponsored research direct costs spent. But that recovery only happens as expenditures are debited against the sponsored research account; indirect cost recovery is an after-the-fact charge. If the principal investigator only spends $25,000 on his project, then only $12,500 will be charged to the sponsor in indirect costs. This underspending makes forecasting actual recovery difficult from year to year.

Research universities have developed two levels of response to the under-recovery of indirect costs. As a community in the national arena, the public and private research universities work through their most prominent associations, the Association of American Universities (AAU), the Association of Public and Land Grant Universities (APLU), and the Council on Government Relations (COGR), to lobby Congress and the White House to honor the negotiated rate agreements and the universities' need for funding that covers all the costs of conducting research. As individual institutions in their state and local arenas, public and private research universities have established indirect cost recovery policies mandating compliance by faculty as principal investigators. For decades, neither effort appears to have changed the trajectory of indirect cost under-recovery (Sedwick, 2009).

Even so, in recent years attention has increased in both the national and local arenas with regard to recovering indirect costs. In the national arena, the White House Office of Management and Budget's revisions to Federal regulations related to Federal assistance and sponsored research, initiated in 2011, generated increased lobbying and efforts by higher education associations to influence the regulations (COGR, 2013). In the local arenas, campaigns to increase compliance with overhead rates on the part of

principal investigators have been discussed in the professional and technical research administration literature (Sedwick, 2009; National Council of University Research Administrators 2013; 2014). Again, little change is seen to date on recovery of indirect costs.

Even as the urgent need for full reimbursement of research costs dominates research funding discussions between higher education associations, research university presidents and Federal funding agencies, one key participant's voice is rarely represented. Faculty, the principal investigators who design, conduct and report on the sponsored research projects, are typically mentioned only when compliance is the issue: compliance with indirect cost policy, with conflict of interest policy, with human subjects protocol policy, or with post award management policy. At the institutional level, the attempt to address indirect cost under-recovery focuses primarily on administrative efforts to get faculty to adhere to the indirect cost policy.

The fact that individual institutions pressure faculty rather than sponsors over indirect cost under-recovery may not be that surprising. The Federal government is not a simple entity to negotiate with over the costs of conducting research projects. Individual institutions spend years on space surveys and consultants to negotiate their Facilities and Administrative (indirect) Costs Agreement with their cognizant Federal agency (typically either the Department of Health and Human Services or the Office of Naval Research). Despite the existence of those agreements, each of the 26 Federal agencies that award research funding frequently add their own restrictions on indirect cost recovery to their awards, based on specific appropriations language, Congressional mandates, or other stipulations. It is extremely difficult for any one institution to

successfully protest an indirect cost restriction coming from an awarding agency by Congressional mandate. Research universities defer that battle to their lobbyists and associations in hopes those entities can whittle away at the Federal cost containment imperative that drives Federal indirect cost restrictions.

Instead, institutions pay much attention to the actions of principal investigators with regard to indirect cost recovery. If a non-standard indirect cost rate is applied to a proposal budget, the faculty member must either prove the sponsor mandates that restriction or request an internal waiver of indirect costs. If neither occurs the faculty member must revise the project budget to accommodate full indirect cost recovery. In the research administration field, faculty members are frequently seen as resistant to including indirect costs on their budgets (Sedwick, 2009). If that is indeed the case, one question would be why? Why would any individual principal investigator/faculty member request less from a sponsor than the institution's negotiated rate agreement allows?

Significance

The National Science Foundation Fiscal Year 2010 HERD Survey indicates that nationwide, the total amount of unrecovered indirect costs on sponsored research for higher education was $4.6 billion. Of that amount, $3.4 billion was covered by public research universities (National Center for Science and Engineering Statistics, National Science Foundation, 2012). Research universities nationwide funded those unrecovered indirect costs out of their own resources, thereby underwriting research projects for Federal, state and private sponsors. The funding for unrecovered indirect costs is

separate and apart from funds research universities spent directly for their own faculty research projects. Higher education's direct funding for internal, institutionally financed research projects totaled more than $7 billion in FY2010.

State legislatures presumably would not be happy to learn that public research universities end up significantly underwriting external research projects. Indeed, state legislators might reasonably assume that state taxpayer funds, or state taxpayer tuition dollars, are providing that support. In addition, the Office of Management and Budget recently reviewed the Federal guidelines for indirect cost recovery, with an eye to containing those costs. The squeeze on funds to support research will likely continue. Given that reality, the necessity of adequate indirect cost recovery becomes more urgent. My analysis of one research university's Fiscal Year 2011 data indicates that approximately 17.9% of the under-recovery on Federal funds resulted from faculty requests for a waiver of indirect costs. The goal of this study is to understand why faculty would seek to curtail this support, and what their perceptions are of this issue. Indirect cost recovery is a seemingly arcane topic, yet has real financial and symbolic impact. My aim is to understand the perspectives of the faculty involved in this phenomenon, given their important role in determining recovery.

In this chapter I have laid out the problem, and provided its background and significance. I have indicated the purpose of this study, and outlined the research questions. In the following chapter I provide definitions for key terms, and outline the theoretical and conceptual framework structuring the study.

CHAPTER TWO: CONCEPTUAL FRAMEWORK

This chapter provides a definition of terms used throughout the study, and then lays out the explanatory scheme derived from anthropological theory. That scheme incorporates organizational culture, faculty socialization and political bargaining models in the conceptual framework.

Definition of Terms

Affiliation

Affiliation is the connection or association an individual has with the other members of a particular group. In the field of anthropology, affiliation is one of many types of relatedness examined in kinship studies. These categories of human relationships can be biologically based or community based. Affiliation in modern organizations is conducted through socialization. Socialization presumes a sharing of culture in all its specificity and subtlety, through language and other symbolic systems, so as to bond the members of an organization to a common purpose.

Authority

Authority, as defined by Messenger (2007), is the "legitimate (i.e., accepted and expected) prerogative to make decisions binding upon others" (p. 80). Types of authority in higher education include expert (discipline based), referent (normative), contractual (legal), and managerial (positional). Authority, along with influence, is one of the critical elements in the exercise of power (Pfeffer, 1981).

Culture

Culture is the adaptive process created by humans in order to survive in the physical world. Culture is composed of shared symbolic systems (language, beliefs, values), and shared social behavior (functional choices) informed by the symbolic systems. Culture is a dynamic positioning system, the "informal logic of actual life" (Geertz, 1973, p. 17), shaping and guiding human social groups' attitudes and actions.

Decision-Making

Decision-making is authoritative choice made between alternatives, in organizations typically related to policy determination or resource allocation (based on Geary, 1992). Decision-making assumes a degree of bargaining or contest in making a choice, and a degree of competition between parties involved in the decision.

Indirect Costs

Indirect costs are incurred for common or joint objectives related to university research programs which cannot be readily identified with a particular grant or contract, i.e., they are embedded in the overall operation of the institution. These costs are segmented into facilities (space, utilities, maintenance) and administrative costs (support personnel). An indirect cost rate is a device for determining fairly what proportion of indirect cost each program should bear. An indirect cost rate is established on the basis of an indirect cost rate proposal and supporting documentation submitted by the organization and approved by the Federal government. The rate is set as a ratio between the total indirect expenses and a direct cost base.

Influence

Influence is the impact of individual action exercised in an attempt to affect decision outcomes, mediated by the relative power, skill and will of the actor (Malen, 1984).

Knowledge

Knowledge is defined, for the purposes of this study, as the critical information necessary to obtain desired resources or to assess decision alternatives. At the institutional level, that knowledge may involve explicit policies and procedures related to research funding, as well as implicit understandings and common practices of the organization.

Power

Power is the potential, by virtue of the control of appropriate resources, and the exercise of related authority and influence, to affect decision outcomes (Pfeffer, 1981; Geary, 1992; Malen, 1993; and Messenger, 2007). Individual capacity and motivation affect the use and outcomes of power, as does the differential in power between actors in the decision-making process.

Resources

Resources, as defined by Geary (1992), are the "tangible and intangible assets that are owned or controlled by one actor and needed or desired by another actor and which, therefore, may be used as a means of influence" (p. 53). This notion of resources

is expanded to include critical items not necessarily controlled by another actor, such as time. For the purposes of this study, resources tracked fall into four categories:

Economic resources.

This resource consists of direct financial support, or the potential of direct financial support, for goals, projects, and objectives of an individual or institution. This resource can be augmented or depleted by decision outcomes.

Temporal resources.

This resource consists of the time needed to achieve a goal, project, or objective of an individual or institution. This resource can be augmented or depleted by decision outcomes.

Affiliation resources.

This resource is an intangible one, consisting of the connections and relationships that support the individual in achieving her or his goals, project or objective.

Reputational resources.

This resource is an intangible one, consisting of the role success, knowledge, status, and recognition necessary for an individual or institution to achieve their goals, project or objective.

Socialization

Socialization is the process by which individuals are incorporated into a particular group or community. It is dependent on sharing symbolic systems and social behavior, in effect learning the culture of the particular group or community. Socialization occurs continuously during an individual's life, and varies in intensity and depth depending on the setting into which one is being socialized.

Sponsored Research

Sponsored research is externally provided, non-gift, grant and contract funding to support research, training, service and fellowships at institutions of higher education. For public research universities sponsored research typically provides between 25-30% of institutional revenues. Sponsored research funding includes direct costs to conduct the projects, and indirect costs underwritten by the institution to support the research infrastructure. Public research institutions count on the recovery of these indirect costs in order to maintain their research programs, as the majority of such research is underwritten and paid for by the institution upfront and only reimbursed after the fact.

Symbolic System

Symbolic systems are patterns that serve both as a model *for*, and a model *of*, extrinsic information and processes necessary for a community to survive (Geertz, 1973). As Geertz states:

> Unlike genes, and other non-symbolic information sources, which are only models *for*, not models *of*, culture patterns have an intrinsic double aspect: they

> give meaning, that is, objective conceptual form, to social and psychological reality both by shaping themselves to it and by shaping it to themselves. It is, in fact, this double aspect which sets true symbols off from other sorts of significative forms. ..The perception of the structural congruence between one set of processes, activities, relations, entities, and so on, and another set for which it acts as a program, so that the program be taken as a representation, or conception – a symbol – of the programmed, is the essence of human thought. The intertransposability of models *for* and models *of* which symbolic formulation makes possible is the distinctive characteristic of our mentality (1973, p. 95).

The complex notion of symbolic systems is the core of anthropological theory. As symbol-makers, humans use symbolic systems to create, express, share and revise knowledge, interpretations, and beliefs. These symbolic systems permit the transmission, dissemination, and absorption of the core values that hold particular human groups together. Through the use of language, art, kinship, and religion, communal group behavior is mediated and shaped by shared symbolic systems that communicate values, explain practices, and guide the communal functional response to the environment.

Review of the Literature and Conceptual Framework

This study seeks to understand the perspectives of public research university STEM faculty regarding indirect cost recovery, and to explain faculty behavior towards the application of indirect costs on sponsored research projects. In this section I describe the anthropological theoretical basis for this approach, and the conceptual streams of

organizational culture studies, faculty professional socialization literature, and political bargaining models that inform the key organizing analytical themes of context, content, and contest. I draw upon William Tierney's work on higher education organizational culture and decision-making to develop my key variables. Finally, I fully present the conceptual model that informs the research design.

Anthropological Theory

This case study draws on a theoretical and conceptual framework grounded in the anthropological tradition. In the discipline of anthropology, fundamental theory posits that human culture arose in response to the realities of the environment and the need to survive. Culture is the adaptive mechanism humans create in order to survive in the physical world; as Harris states, "human social life is a response to the practical problems of human existence" (2001, p. x). Harris's notion of *cultural materialism,* one of the foundational theoretical approaches in anthropology, assumes that the infrastructure of human society, developed to address basic biological and emotional needs, is composed of interrelated social-organizational and political-economic structures, with a superstructure of ideological and symbolic systems informing those components. In essence, mankind has adapted to the world around it, not primarily by biological changes, but by creating symbolic systems, such as language, kinship, religion, and art, and through the use of technology, such as irrigation, tool-making, writing, and transportation.

Geertz takes this notion further, advancing the other foundational approach in the field of anthropology, *interpretive* or *symbolic anthropology*. Geertz pushes the

importance of understanding symbolic systems and emphasizes that the meaning of the social world and physical world are expressed throughout a culture in complex, interwoven and subtle ways which anthropologists seek to understand and interpret. Geertz cautions that culture is not a static representation or mere context or background, but instead is the operational, "informal logic of actual life" (1973, p. 17). He adds that "behavior must be attended to, and with some exactness, because it is through the flow of behavior – or more precisely, social action – that cultural forms find articulation" (op cit.). For Harris and Geertz the concept of culture encompasses both the symbolic systems expressing values, beliefs, and attitudes, and the social interactions and behaviors that are informed by those symbolic systems.

For anthropologists, key concepts from the academic disciplinary domains of political science, economics, sociology and psychology are integrated as elements and expressions of culture and the human adaptation to the physical world. In addition, during the past several decades anthropologists have expanded beyond investigating primarily remote tribal societies to investigating contemporary urban societies. Along with practitioners of other social science disciplines, anthropologists attempt to understand the complex organizations of which most of us are a part. Whether focusing on more or less developed societies, however, the fundamentals remain the same. Culture is about shared meanings (interpretations) and shared approaches (functional choices) to the world; it is dependent on language and communications in various forms to learn the "way of the world." As communal creatures, humans form groups. As tool-makers, humans use technology to adapt to the environment or make the environment adapt to humans needs. As symbol-makers, humans use symbolic systems to create,

express, share and revise knowledge, interpretations, and beliefs – the core values that hold their groups together – through the use of language, art, and religion. Communal group behavior is mediated and shaped by shared symbolic systems that communicate values and explain the communal functional response to the environment. Becoming culturally competent is necessary in order to participate fully and belong to a particular social world, to be integrated into the clan, tribe, community, or organization. These anthropological constructs hold true in modern complex societies, with the added factor of multiplicity. On a daily basis, modern humans move between many layers of communal groups and a vast array of symbolic systems.

Drawing on the core approach of anthropological theory, and its emphasis on symbolic systems and their alignment with social behavior, I sought to find analyses that used an anthropological lens on higher education institutions.

Tierney's use of anthropological theory.

One of the few researchers using an anthropological cultural perspective to understand the modern complex organization of higher education is William Tierney. In his book, *The Impact of Culture on Organizational Decision Making*: *Theory and Practice in Higher Education*, he discusses the issues of tenure and promotion, student retention, and academic governance within the organizational culture framework he has developed for understanding higher education institutions. This framework contains six elements of higher education organizational culture: external environment, mission, socialization, information, strategy, and leadership. Using his framework as a starting point, I adapt this construct to help understand a different type of phenomenon in higher

education; not organizational culture writ large, but organizational culture as it plays out at the subgroup level. Tierney himself states, “I have used the term ‘organizational culture’ but have made no mention of its subsets: subculture, anti-culture or disciplinary culture.” He continues, noting that an investigation of cultural subsets may help institutions learn how to decrease conflict in particular groups, and finally adds that “an important research activity for the future will be the refinement and extension of this framework” (Tierney 2008, p. 40).

Beyond his concern for cultural subsets, Tierney has an overarching view of organizational culture. He states, “An organization’s culture is reflected in what is done, how it is done, and who is involved in doing it. It concerns decisions, actions, and communications on both an instrumental and a symbolic level” (2008, p. 24). Tierney sees institutions as influenced by demographic, economic, and political forces but also equally shaped by the values, processes, and goals of those who function in them. In his study of colleges and universities as cultures he notes a set of operative cultural concepts and terms that form his framework for studying collegiate institutions as cultures. He uses this array of elements to conduct a critical ethnographic study of three different institutions, with a focus on the intersection of academic and disciplinary life and the impact of ideology on curricular decisions. Defining ideology as “a dynamic system of values and priorities, conscious and unconscious, by which people organize their actions and expectations and explain their choices” (Tierney 2008, p. 53), he determines that the relationship between culture, ideology and knowledge is key to understanding how an academic organization interprets and re-interprets its external and internal environment. He calls for a more expansive and creative approach to shared academic governance,

one that acknowledges the core values and identity of the institution without reifying the institution, and allows for strong multi-vocal communication and "creative conflict" in order to advance innovation and enhance adaptation to changing circumstances (Tierney 2008, p. 164).

Tierney has an agenda, in that he believes a critical, postmodernist approach will not only illuminate the notion of organizational culture in higher education, but also shift perspectives, and allow for a view of socialization and assimilation that can honor difference and discontinuity and expand what is meant by organizational fit, rather than focus on acceptance of predetermined norms as the primary goal of enculturation (p. 97). He applies his framework for studying organizational culture in higher education to key issues of institutional mission and curricular decisions, academic governance and communication, and faculty and student socialization and diversity.

Although he characterizes his framework as a set of operative cultural concepts, it is difficult to ascertain how these terms or elements interact. Instead he arrays them as avenues for investigation, whose weight and importance will vary by the specific institution (Tierney 2008, p. 29). For the purposes of this study these elements are restructured along a more traditional anthropological framework, in order to clarify how these cultural concepts function together and to uncover how they operate. Consequently, his theoretical model is reworked and adapted to create a conceptual framework incorporating organizational culture as the context, professional socialization as the source of values or ideology, and political bargaining as the decision-making process. These elements interact through a set of key variables that may explain research faculty response to indirect cost recovery on their sponsored research projects.

For this model, the environment of a collegiate institution sets the parameters for the organizational culture, the particular demographic, economic, and political external factors which the organization must address in order to survive. Mission, socialization, and information are all articulations of the values, beliefs, and norms embedded in the culture and expressed through the culture's symbolic systems. Strategy and leadership are components of decision-making, a social behavior which reflects and enacts the values and beliefs communicated and shared through the symbolic systems. Aligning Tierney's array of terms along this framework allows the model to be dynamic and functional. Clarifying the anthropological framework as it relates to this model of organizational culture in higher education also allows this study to expand on socialization as a primary means of enculturation, and on decision-making as a primary social behavior, which together may inform an understanding of public university research faculty perceptions of and response to indirect cost recovery.

Respecting Geertz's caution that culture is never mere context, for the purposes of this study, organizational culture in higher education is characterized as context, so as to more fully describe and delimit the world in which this phenomenon is occurring. In this case, the particular organizational culture of the public research university involved in the study is seen as the complex context incorporating institutional structures, administrative processes, and procedural responses to external and internal environmental pressures and demands. This notion of *context* is the first construct of the conceptual framework. The next section connects this concept not only to anthropological theory and Tierney's framework, but also to the bodies of literature exploring organizational culture.

Organizational Culture in Higher Education

Over the past century organizational culture studies emerged in the fields of sociology, political science, economics and management. Several approaches have dominated organizational culture studies overall, as well as organizational culture in higher education studies; they are outlined below and assessed for their ability to illuminate organizational culture in higher education as context.

Organizational culture and resource dependency.

The context for public higher education includes both the internal structures and the external pressures that shape its response to the environment. Resource dependency theory as presented by Pfeffer and Salancik (2003) offers a powerful view of organizations as entities continually trapped in the flux of external forces that frequently constrict or deny critical resources necessary for the organization's survival. Given the uncertainties of this position, organizations seek many avenues to reduce or mitigate their dependency on these external agents. One key strategy is to enact inter-institutional agreements that codify the relationship between interdependent entities and thereby reduce uncertainty (p. 40). Another strategy is to constantly seek alternative resources, which once in place also offer respite from uncertainty (p. 46). The existence of negotiated rate agreements between research universities and the Federal government is an example of inter-institutional, interdependent agreements that clarify and formally acknowledge anticipated resources, such as indirect costs on sponsored research.

Slaughter and Leslie (1997) and Slaughter and Rhoades (2004) describe public higher education institutions through the lens of resource dependency theory, in

particular the search for alternative resources. Their thesis contends that the net effect of the global economic expansion has been to push all countries, and thereby all government-funded public institutions, into a global market competition, as capital moves to the least cost environments. Government revenue shrinks as global competition increases, slowly defunding public universities. In need of revenue, public research universities increase their focus on obtaining external funds for research, effectively shifting the research agenda from the search for fundamental knowledge to a competitive arena that offers applied research as a product for external funders (Slaughter & Leslie, p. 21). Slaughter and Leslie call this process academic capitalism and describe the role of faculty in this arena as "state subsidized entrepreneurs" (p. 9).

Resource dependency theory functions then as a framework for explaining institutional response to the external environment. The classic study and its expansion (Pfeffer & Salancik, 2003) make clear the emphasis is on the inter-organizational dynamics. Less attention is paid to internal processes or operations. Although external resource dependencies affect internal power dynamics, the primary assumption is that managers who help the organization obtain resources derive more decision-making power as a result of their role in ensuring organizational survival (Pfeffer & Salancik, 2003). Complex intra-organizational response to resource dependencies is not explored in these studies.

Slaughter and Leslie expand the resource dependency framework to include the actions of faculty in the drive for external funding. In particular, they note faculty relationships with the funding organization's technical representatives, in effect, their counterparts at the disciplinary level (p. 122). Academic capitalism explains some of the

pressures that have increased the reliance on external funds at public research universities, but Slaughter and Leslie's analysis does not go beyond the direct actions of faculty in seeking external monies to look at any of the intra-organizational processes or conflicts involved. Resource dependency theory provides a lens for understanding an organization's response to critical resource needs. Assessing how that response plays out in higher education organizations in particular is the focus of other theorists.

Organizational culture as symbol and typology.

Using concepts first promoted in anthropological theory and ethnography, other institutional theorists see organizations as socially constructed systems (Wieck, 1976; Hatch, 1995; Martin, 1992; Scott, 2003). These organizational systems are embedded in "webs of significance" (Geertz, 1973, p. 5), sets of symbolic structures (Martin, 1992; Scott, 2003) and shared ideologies (Tierney, 2008) they themselves have spun. This "web of significance" is dependent on communication, the ability of the members to come to share a common interpretation of the environment. Among members of the same community this shared cognitive framework has variously been called "sensemaking" (Weick, 1995) or more traditionally, socialization (Merton, 1957). Building on this theme of socialization and socially constructed systems to negotiate the environment, another set of theorists have advanced the concept of organizational culture as a frame for understanding institutions (Schein, 1992), and in particular, higher education institutions (Birnbaum, 1988; Bolman & Deal, 1997; Bergquist & Pawlak, 2008; Tierney, 2008; Manning, 2013).

For example, Birnbaum's (1988) analysis of organizational cultures in higher education institutions incorporates Weick's (1976; 1995) emphasis on organizational sense-making and the existence of loose coupling as an adaptive mechanism. The concept of loose coupling assumes weak linkages, infrequent communication, and little interdependency between units in an organization. This concept characterizes the structure of many large public research universities, and partially explains the ability of the multiple quasi-independent units to co-exist within one organization. Birnbaum describes how normative organizations such as universities, which rely on referent and expert power rather than coercive or utilitarian power, come to interpret organizational reality through several stages of sense-making (Birnbaum 1988, p. 66). Birnbaum presents four archetypes of sense-making in higher education cultures: collegial, bureaucratic, political, and anarchic; he also offers one integrative model he calls cybernetic. He notes, however, that in complex higher education institutions each of these archetypes co-exists (Birnbaum 1988, p. 175). Birnbaum also addresses the structure of academic leadership and decision-making imbedded in higher education organizations. Dualism of control in academia, between the professional authority of the faculty and the managerial authority of the administration, is a constant friction (Birnbaum 1988, p. 10). Given the reality of multiple segmented communities with multiple and conflicting demands and priorities, decision-making is primarily about the "management of meaning" (p. 78) in order to re-order and mitigate the multiple interests and demands involved. Using March and Cohen's (1978) concept of "garbage can decision-making," Birnbaum outlines a process in which the institutional reality of diffused power and responsiveness is frequently handled by resorting to what he calls

"garbage cans." These "garbage cans" consist of long-range planning committees, deferred board actions, academic senate panels and other buffers to sort and absorb problems. Loose coupling assists this process by allowing attention to be paid to an issue in one unit without impeding the activities of another unit.

Birnbaum's (1988) analysis embraces higher education organizational culture as structured sense-making and sees organizations as complex, interwoven systems. No discussion occurs as to how sense-making comes to be shared within the institutions or whether all the members embrace the model; individual efficacy is not addressed except for the case of presidential leadership.

This focus on leadership as the essential element of culture determination in an organization reflects what Martin describes as the integrationist approach to organizational culture studies (Martin, 1992). In the first of three perspectives Martin outlines as dominating organizational culture theory, she describes the integration perspective as positing homogeneity and consistency in organizational culture and depending on organizational leaders to create and sustain culture. The champion of this perspective is Schein (1994; 2004), who states that organizational leadership and culture are "two sides of the same coin" (Schein, 2004, p. 7). Harmony, consistency and a shared consensus on organizational values and goals are the hallmarks of the integration lens. According to Martin, the second approach, the differentiation perspective, instead focuses on intra-organizational conflicts among sub-groups and the resultant jockeying for power and resources, as well as the adaptive process of loose coupling to prevent disintegration (Martin, p. 89). Contradictions and competition are the key markers of the differentiation perspective. Finally, the fragmentation perspective focuses on ambiguity,

complexity and instability in organizational culture (Martin, p. 130). Rather than integrate into an overall culture or sub-cultures, organizational members move between shifting coalitions depending on the emergent issues (Martin, p. 153). Power is extremely diffused, disaggregated and subject to constant change. Martin's integration perspective is reflected in Birnbaum's collegial and bureaucratic models, with their emphasis on consensus and harmony. The differentiation perspective mirrors Birnbaum's political model, and the fragmentation perspective aligns with his anarchic model.

Just as Birnbaum (1988) indicates in his study that multiple archetypes exist in complex higher education institutions, Martin (1992) also contends that all three perspectives exist in complex organizations. Martin, however, does not emphasize the position of designated leaders over other elements in determining organizational culture. Martin's tri-partite analysis, while not specific to higher education, incorporates Birnbaum's approach and broadens his approach to include power dimensions within sub-groups and sub-cultures not clearly identified in his presentation.

Although these studies discuss the complexity of organizational culture in higher education, they typically present their descriptive models as institution-wide constructs. (For example, Birnbaum's typology of collegial, bureaucratic, political, anarchic, and cybernetic; Bergquist and Pawlak's typology of collegial, managerial, developmental, advocacy, virtual, and tangible; and Tierney's typology of collegial, political, cybernetic, and innovating cultures). All these lists of types offer an array of models without any specifics as to how or where these organizational cultural archetypes co-exist or overlap. Tierney, however, does move beyond listing the typologies to discuss

specific elements of organizational culture in higher education, with a focus on decision-making.

Tierney's approach to organizational culture.

Tierney (2008) integrates prior organizational culture theory to craft what he calls a critical postmodern take on organizational culture in higher education, and in particular, decision-making processes. He asserts that complex organizations such as higher education institutions are always "cacophonous and multivocal" (p. 14), burdened with competing sub-units, fragmented agendas and limited resources (p. 26). Although the bureaucratic, collegial, political, anarchic and cybernetic models are revisited in his study of academic governance, Tierney emphasizes that these models can serve as lens to illuminate portions of academic decision-making but none provide an accurate, holistic portrait of the current environment in which higher education institutions exist (p. 155). Instead, the higher education organization itself, and the environment in which it operates, are constantly being interpreted and re-interpreted by the shifting members. The organization's critical need is to distill the core values essential to its existence, even as it allows processes and structures to be innovative and responsive to change and diversity, to be creative and sustaining at the same time. Tierney calls this approach the innovating model.

Tierney expands on this theme by noting that internal contradictions between what the institution says and what it does expose an incongruity between the culture of the organization and the environment. Rather than offer selective attention to the environment and discount the dissonance, he emphasizes the need to address these

contradictions as markers making clear where shared meaning and purpose have not been achieved. The goal for learning organizations and knowledge-creating organizations such as universities is to accept difference and discontinuity, so that organizational culture is not merely discovered but re-created and renewed (p. 99). Consequently, individual behavior and choice can illuminate the organizational culture and its efficacy.

Using critical ethnography as his methodology, Tierney presents five different case studies that over time led to his framework for analyzing organizational culture's impact on organization decision-making in higher education. He derives from these studies the essential cultural elements that must be investigated if one is to understand the particulars of any higher education institution: its environment, mission, socialization, information, strategy and leadership (p. 30).

Drawing on Tierney's framework, this study uses select elements of organizational culture in higher education to form the first key construct of *context* for explaining the phenomenon of public research university faculty perspectives on and behavior toward indirect cost recovery on sponsored research. The *context* of higher education organizational culture in this study includes research university institutional mission, external political and financial pressures, and internal administrative policies and procedures, which together form the institutional world where the phenomenon of interest occurs. In particular, the organizational culture of higher education attempts to address the *resource needs* it encounters, as it works to maintain its mission, its finances, and its goals and objectives. This first conceptual construct of *context*, then, is derived from organizational culture studies, resource dependency theories, and higher education

organizational culture models. Context reveals the organizational culture and its resource needs.

The next construct of *content* reflects faculty socialization and the development of mutually shared values and beliefs that inform faculty behavior.

Faculty Socialization and Faculty Reward Systems

Clark (1987), Boyer (1990), Blackburn and Lawrence (1995), Fairweather (1996), Diamond (1999), and Schuster and Finkelstein (2006) have all noted that research university faculty are rewarded, particularly in compensation, for their scholarship more so than their teaching. Fairweather and Beach's 2002 study of 88 Carnegie Research I universities confirmed the preeminence of research in faculty reward systems despite policy initiatives to improve and acknowledge teaching (Fairweather & Beach 2002, p. 112). Obtaining research funding is a key prestige element for both the faculty and the administration at the more than 200 research intensive higher education institutions (Holton, 1998; Morphew & Baker, 2004; Fairweather, 2005; Schuster & Finkelstein, 2006; O'Meara, 2007; O'Meara & Bloomgarden, 2010). The importance of external funding at the research intensive institution is directly linked to external funding's weight as a factor in faculty promotion and recognition. Discussions regarding faculty reward systems reference the multiple roles and pressures on faculty to achieve professional goals and institutional mission (Diamond, 1999; O'Meara, 2006). Higher education researchers have challenged its leaders to move beyond the view of faculty as just another cost factor in institutional financial and strategic planning (Rhoades, 1998; O'Meara, Terosky, & Neumann, 2008;

Kezar & Maxey, 2015). Despite these calls for balance, however, it is clear that research publications and research funding still predominate in the assessment of faculty productivity at research intensive higher education institutions.

This is not to say, however, that public research university faculties who successfully obtain research funding are free from pressure. On the contrary, particularly in the biological and physical sciences, research intensive higher education institutions expect that public research university faculty will obtain sufficient funding on an annual basis to maintain their laboratories, equipment, and graduate students (Schuster & Finkelstein, 2006). This pressure has not abated despite the precipitous decline in grant proposal success rates as a result of reductions in Federal funding for basic research (National Science Board, 2012; Office of Extramural Research, National Institutes of Health, 2012). In addition, even as funding levels have declined, the administrative burden entailed in conducting sponsored research projects has dramatically increased. According to the Federal Demonstration Partnership's 2007 Faculty Workload Survey of 6,000 principal investigators, and the 2012 Faculty Workload Survey of 13,000 principal investigators, faculty indicate they spend 42% of their time on the administrative requirements of reporting, budgeting and compliance mandates for a project rather than on conducting the research (Rockwell, 2009; Schneider, 2014). Given the time compression already squeezing tenure-track and tenured faculty (Milem, Berger & Dey, 2000; Schuster & Finkelstein, 2006), the prestige of obtaining research funding appears to come at a cost. Externally funded public research university faculty can expect to be on a never ending cycle of grant writing, proposal submission, award management and project reporting.

Despite this cost, public research university faculty in aggregate continue to pursue research funding, conduct research, teach in their area of expertise, and perform service to the institution. All of these activities are part of their professional socialization, the culmination of years of training in graduate school and in their discipline. As Tierney and Bensimon discuss in their 1996 study of tenure and promotion on 12 campuses, junior faculty undergo "anticipatory socialization" in graduate school and move on to "organizational socialization" at their hiring institution (p 37). The doctoral initiation rite of a significant independent research inquiry (a dissertation) is the key aspect of "anticipatory socialization," developed alongside the communal immersion in a disciplinary tribe (Becher, 1989). As in other fields of expert professionalism such as medicine or law, the lengthy training period enhances group affiliation and the full dissemination of professional norms, practices, values and beliefs. Once training is complete, the graduate student ideally advances to the next level of socialization, "organizational socialization," at the individual institution of the new faculty member's appointment. Once there, the particular culture of the organization structures and guides the future of the faculty, and the related recognition, rewards and advancement (Tierney & Bensimon, 1996). Research university faculties frequently are described as "cosmopolitans" whose allegiance is to their discipline rather than to their campus (Birnbaum, quoting Gouldner, 1988, p. 19). It may be that for individual research university faculty their anticipatory socialization, the complete immersion in professional mores and relationships developed during graduate school, essentially override organizational socialization at any particular institution (Bess & Dee, 2014).

The symbolic systems adopted by the incipient faculty member over her or his years of training are multiple and complex. In their professional socialization they have worked through formal disciplinary, intellectual, scientific, technical, collegial and linguistic systems, as well as informal group affiliations and allegiances. They have learned the "ways of their world," adopted the prevailing practices and procedures, absorbed the dominant values and beliefs, and adapted them as their own in their professional life (Becher, 1989; Tierney & Bensimon 1996; Schuster & Finkelstein, 2006). Extraordinary time and effort have gone in to this achievement. They now have a set of goals and a mission for their career path, based on their professional disciplinary expertise and experience. They have been socialized into their professional academic arena, and this overarching symbolic system is the *content* upon which their response to organizational culture is drawn.

This second key construct of *content* is a factor in the phenomenon of research university faculty response to indirect cost recovery. This content of faculty professional socialization expresses itself in the way faculty value certain resources over others. In particular the manner in which faculty apportion their time, maintain their disciplinary reputation, and access institutional resources can be seen as markers of *resource values*. Content reveals faculty socialization and its resource values.

The final construct of *contest* reflects the political bargaining that occurs over resource constraints at the institutional level.

Political Bargaining Model

Studies of faculty involvement in financial and budget processes focus on their representation on institutional committees, their decision-making as department chairs, or their allocation of time and resources between teaching, research and service (Barr, 2002; Schuster & Finkelstein, 2006; McKeown-Moak & Mullin, 2014). Faculty are generally much more involved in academic decisions than fiscal decisions at the campus level, though that can vary greatly by institution. Still, surveys confirm less faculty involvement in budgetary matters overall (Chronicle of Higher Education, October 7, 2013), beyond concern over salary increases and hiring.

In contrast to the overall lack of involvement by faculty in institutional fiscal and budgetary matters, the principal investigator in charge of an externally funded sponsored research project is expected to maintain oversight over all financial aspects of the project. She or he is responsible for approving expenditures and hiring staff, forecasting budgets over the course of the project, and accounting for cost overruns or underspending (both of which can affect the scope of work). In many departments administrative support personnel handle some of these duties, but ultimately the principal investigator is the decision maker and the individual held responsible for the financial management of the funds (see site institution roles and responsibilities matrix, Appendix B).

Public research university faculty who serve as principal investigators on externally funded sponsored research projects, therefore, become deeply involved in planning what costs will be necessary to successfully conduct a research project. Given

the constant cycle of grant writing, proposal submission, award management, and project reporting, as noted earlier, principal investigators find themselves confronted with the reality of indirect costs, as well as direct costs, on every grant they propose or receive. They must include full indirect cost recovery on their proposal budget, or provide justification for non-standard indirect costs based on sponsor guidelines, or request a waiver or reduction in indirect costs.

A percentage of public research university faculties will go through the formal waiver request process. No public research university reveals exactly how many faculty request waivers of indirect costs; therefore, one can only estimate based on limited access to institutional data and verbal accounts. At one research intensive institution, records indicate that approximately 10% of principal investigators with active awards requested a waiver or reduction in indirect costs (AVP, personal communication, March 5, 2012). In addition to a direct request for a waiver on an individual project, two other methods are frequently used by principal investigators to reduce the indirect cost rate. One technique is to locate a project in rental space off campus and outside the space survey for the negotiated rate, thereby avoiding the facilities portion of the indirect cost rate (the facilities portion of the rate is typically roughly half of the total rate). Another technique is to include sub-awards on the project even if the contract component is actually a procurement or purchase of services. The distinction here is that sub-awardees are considered to be collaborators, significantly involved in the design, conduct, or reporting on the project; a purchase of services or procurement is considered a standard acquisition necessary for the project but with no distinct, special relationship with that particular project. The determination of whether the expenditure is for a sub-award or a

procurement is critical, because sub-awards are exempt from indirect costs once more than $25,000 has been expended. Therefore a sub-awardee on an award only incurs $12,500 in indirect costs if the negotiated F&A (Facilities and Administrative) rate is 50%, no matter the total amount of the sub-award during the life of the project. Millions of dollars for a sub-award will still capture only $12,500 in indirect cost recovery.

All of these approaches (making a waiver request, using off campus facilities, or the inclusion of subawards) involve a review and approval process with the central research university administration, usually the sponsored programs or research administration office. This intersection is where the political bargaining model comes into play, as public research university faculty and public research university administrators negotiate a fiscal policy decision.

This contest over indirect cost recovery is part of a larger picture outlined by Bess and Dee, who state “conflicts between faculty and administrators are prevalent and pervasive on college campuses” (2014, p. xiii). They note the growth in the power of higher education administration and the adoption of corporate practices and values, which emphasize centralized, hierarchical power and decision making. They characterize that shift as managerialism (Bess & Dee, 2014, p. 23). It appears that over the past decades, the administrative segment of universities, what Hackman (1985) called the periphery, has migrated to become part of the core, or essential component of an academic institution. That change, according to Bess and Dee, has exacerbated tensions between faculty and administrators (2014, p. 7). It is not surprising, then, that political bargaining and conflict between faculty and administrators arise over the imposition of indirect cost recovery on sponsored research projects.

The political bargaining model is more often invoked in studies of the education policy-making process at the government level (Curtis, 2011; Geary, 1992; Malen, 1993), rather than studies of education policy implementation at the institutional level. Exceptions include multiple perspectives approaches that examine policy practice issues, and that include a political lens (Hackman, 1985; Prestine, 1989; Malen & Knapp, 1997). For the purposes of this study, the political bargaining model is invoked to illuminate the *contest* between the managerial authority of public research university central administrators, and the expert authority brought to bear by public research university faculty in an attempt to influence the decision outcomes related to indirect cost recovery.

Geary notes that the "active expressions of power are influence and authority" (1992, p. 17), and quotes Pfeffer's five conditions for the use of power in organizational decision-making: interdependence; incompatibility of goals; competition for scarce resources; issue salience; and the relative distribution of power (Pfeffer, 1981). All of these conditions are present in the case of decision-making and decision outcomes regarding indirect cost recovery. First, in contrast to the "organized anarchy" view of the decoupled, independent units in higher education, public research university faculty and public research university administrators are completely interdependent when it comes to sponsored research. Faculty propose and conduct externally funded research projects, but only institutionally authorized administrators can formally accept and account for external sponsored funding. Second, the goal of a faculty member to undertake a research project is part of the research university mission and not necessarily incompatible with the goals of research university administrators, yet frequently their

goals come into conflict when issues of funds management or compliance requirements arise. Third, competition for scarce resources is ever- present in the public research university setting, and certainly in the case of sponsored research, as administrators seek indirect cost recovery while faculty focus on the direct costs to conduct their project. Fourth, the issue of indirect cost recovery has salience; it is on the front burner of public research university administrators struggle to maintain the institutional research portfolio. Finally, the relative distribution of power in this arena might engender conflict, as university administrators have managerial authority over the use of sponsored research funds but faculty have expert authority in determining what funds are necessary for a successful research project.

Based on Geary's and Pfeffer's conditions, then, it is no surprise that political bargaining and the expression of power through influence and authority can be seen in higher education institutions and in the higher education decision-making process regarding indirect cost recovery. Political bargaining over constrained resources and faculty and administrator conflict over separate goals is the third construct of *contest* incorporated in the theoretical framework. This construct is exhibited by the *resource allocation* that occurs as a result of the intra-organizational decision-making process. Contest reveals political bargaining and its consequent resource allocation.

The three conceptual streams of organizational culture in higher education, faculty socialization, and the political bargaining model, along with their derived themes of context, content, and contest, have just been outlined. These themes are now consolidated into a theoretical framework that may help explain the phenomenon of public research university faculty response to indirect cost recovery.

Conceptual Framework for Analysis of Case Study Data

This conceptual framework addresses the set of assumptions driving this study. The first assumption is that faculty response to and behavior towards indirect cost recovery represents values, beliefs, and choices drawn from the distinct professional socialization and distinct culture of faculty. The second assumption is that when faculty and institutional administrators are in conflict over indirect cost recovery, the resultant formal administrative decision may come about through political bargaining over critical resources. The theoretical framework incorporates the three conceptual streams of organizational culture, faculty socialization, and political bargaining, and arrays them along anthropological theoretical tenets so as to uncover the operating elements that may explain these assumptions. Both these assumptions are nested in the dynamics of the organizational culture in higher education.

This study draws on Tierney's model for understanding organizational culture in higher education (Tierney, 2008), and realigns Tierney's elements along a framework that incorporates organizational culture as context, faculty socialization as content, and political bargaining as contest. This framework operationalizes Tierney's model, and makes it a dynamic and interactive process by using anthropological theory to explain what is happening. That explanation rests on the foundational anthropological understanding that human symbolic systems of values, ideology and beliefs inform and guide social behavior with the goal of survival and success in a particular environment. In this framework, then, environmental elements, external and internal, stimulate the survival response behaviors that characterize organizational culture. In this framework, professional goals and rewards are part of the shared values and beliefs that characterize

faculty socialization and its particular symbolic systems. In this framework, strategy and decision-making are social behaviors, incorporated in political bargaining that influences how decisions regarding indirect costs are made. Obtaining the faculty perspective on these elements may help explain faculty attitudes and behavior toward indirect cost recovery on sponsored research.

Conceptual Model

This model shows the relationship between the three key conceptual streams from which the study derives the analytic themes of its framework. The analytic themes align along anthropological theoretical categories, consisting of response to the environment: *organizational culture* or context; binding symbolic systems: *faculty socialization* or content; and consequent social behavior: *political bargaining* or contest. Each of those themes incorporates key variables derived from the underlying theory and concepts. For organizational culture, the key variables are the external and internal environment. For faculty socialization, the key variables are role success, affiliation, and knowledge. For political bargaining, the key variables are authority, actors, and decision-making. These analytic themes and key variables are linked to their indicators: resource needs for content, resource values for content, and resource allocation for contest. The particular resources reflecting these needs, values, and allocation fall into four categories: 1) economic resources, such as external funding and financial support; 2) temporal resources, especially available time, through course releases or administrative support; 3) affiliation resources, such as connections to disciplinary colleagues and former graduate students; and 4) reputational resources, especially role success, status, and recognition. The interplay of these themes, variables and indicators

may illuminate faculty perspectives on indirect cost policy and consequent faculty actions and decisions that affect the outcome of indirect cost recovery.

The fundamental theoretical underpinning of this model is that culture is not a static portfolio of beliefs but a dynamic positioning system that informs behavioral choices. Culture is deeply involved in both the assessment of the constraints by the informants and in their social behavior in addressing those constraints. The goal here is to uncover the symbolic systems and social behavior embedded in the organizational culture phenomenon, to understand from the faculty point of view why they respond the way they do to indirect cost recovery.

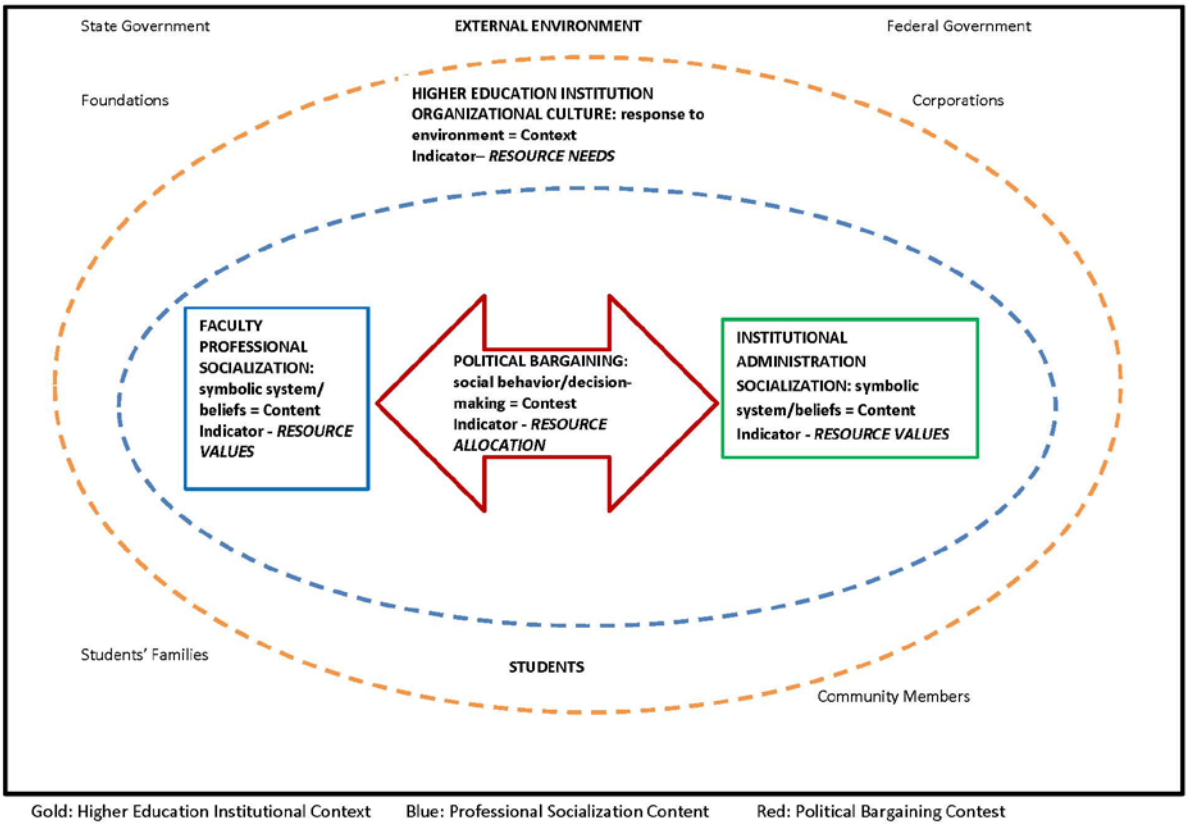
It may well be that alternative factors will be more relevant to faculty. Rather than addressing resource needs, resource values, or resource allocation, perhaps faculty will indicate that their choices and behavior with regard to the phenomenon of indirect cost recovery reflect other concerns. Perhaps political considerations related to authority and resistance will dominate their choices, no matter the resource consequences. Perhaps the majority of research faculty will have no interest in the phenomenon and see it as irrelevant. The limited data available, however, counter these possibilities. The Federal Demonstration Partnership Surveys of principal investigators, with 6,000 faculty surveyed in 2005 and 13,000 faculty surveyed in 2007, presented significant evidence that investigators are concerned about resources related to their research activities, and do not see the issue of indirect cost recovery as irrelevant. In fact, the most recent report states, “Other institution-related frustrations expressed by researchers include issues regarding internal funding policies. Institutions were frequently viewed as taking too much of the indirect cost returns and not using them to pay for much-needed faculty

support" (Schneider, 2014, p. 86). For this study, then, the phenomenon of faculty response to indirect cost recovery can be seen as relevant and possibly revelatory of even deeper and broader public research university faculty concerns.

Figure 2 revisits the conceptual model and outlines the three conceptual streams of higher education organizational culture, faculty professional socialization, and political bargaining. Each of these conceptual streams has an analytical theme, key variables, and an indicator, all of which serve to illuminate the phenomenon and structure the analysis. Resource needs are the indicator for the theme of context, reflecting the organizational culture stream. Resource values are the indicator for the theme of content, reflecting the faculty professional socialization stream. Resource allocation is the indicator for the theme of contest, reflecting the political bargaining stream.

The social behavior exhibited by research faculty and institutional administrators in bargaining over indirect cost recovery resource allocation is expected to reveal the underlying resource values derived from professional socialization and the resource needs required by the higher education institution. Understanding what drives this bargaining contest, and the related professional ideological content and institutional context in which it resides, may help explain the research faculty response to their own and their institution's resource needs.

Figure 2. Conceptual Model



In this model, the higher education institution's organizational culture is the context that broadly includes faculty, administrators, and students. Students, in this case, typically operate outside the phenomenon of indirect cost under-recovery on sponsored research projects. Instead, within the context of higher education organizational culture, pressures related to resource needs interact with the disparate professional socialization of faculty and administrators. These pressures highlight the disparate beliefs of the two groups, and the distinct resource values incorporated in the content of their respective symbolic systems. They act on these beliefs and values, and the resulting contest

engages the two sub-groups in political bargaining over resource allocation. Ultimately this contest produces a decision outcome regarding indirect cost recovery on a sponsored research project.

The domains of higher education context and professional socialization content are permeable, such that, even as external environmental pressures affect the institution and filter into the professional worlds of faculty and administrators, the consequent choices and actions made by faculty and administrators in responding to these pressures in turn affects the institution and potentially the external environment. In this way, the decision outcome resulting from the political bargaining between the two groups over indirect cost recovery will come to filter out of the content and contest arena and back into the context of the higher educational organizational culture.

Given my position as a participant in research administration, I next outline my own perspective on the phenomenon.

Administrator Narrative and Investigator Stance

I have been a sponsored research administrator for more than a decade, and an administrator in higher education for more than 30 years. For many years I have witnessed degrees of conflict between faculty and administrators over indirect costs on sponsored research. In the world of professional research administrators, this conflict is often attributed to ignorance on the part of faculty, at best, or to their intransigence, at worst. For example, a recent national gathering of professional research administrators, the 2014 annual meeting of the National Council of University Research Administrators (NCURA), offered a key session to its 2,000 attendees. Led by a Vice President from the

University of Minnesota, the presentation was titled *"How to effectively influence faculty behavior: Is it possible?"* The session description began with the line, "Faculty members are notoriously resistant to training efforts," and continued with "Faculty seem genuinely clueless about why they can't just charge their equipment to whatever sponsored project has the largest remaining balance (or whatever project is going to be expiring first)." In addition to seeing faculty as apparently willfully ignorant, another professional research administration theme is one of active defiance. Former Association of American Universities President Robert Rosenzweig describes offering testimony to Congressional committees on the necessity of covering indirect costs, only to meet faculty disciplinary societies and scientific associations coming in behind him to argue just the opposite (1998, p. 4). Finally, one also finds the theme of covert operations. Faculty and program officers at Federal agencies often share the same disciplinary training and scientific backgrounds, and as Rosenzweig also notes, "No program officer ever found satisfaction in thinking about the amount of money his or her agency was providing for indirect costs" (op cit., p. 4). It is not unusual to find out a program officer and faculty member have "worked out a deal" about the indirect costs during their review discussions about a proposal, and subsequently some sort of limitation on indirect costs appears on the award. This problem happened frequently enough at the National Science Foundation that senior officials had to issue a direct prohibition of any such manipulation of indirect cost allocation (National Science Foundation, 2013; J. Feldman of NSF to NCURA annual meeting, 2013).

On many occasions when witnessing such faculty and administrator conflict over indirect costs, I have thought that the parties seem to be speaking different languages.

And of course they are. As representatives of two distinctly different professional groups in a large, highly decentralized, highly complex organization, each group is operating from its own cultural perspective. Language is the fundamental symbolic system for expressing cultural perspective. As we talk across one another about compliance and regulations and audit findings, or about material transfers and timely award set-up and postdoctoral hires, the conflict is not assuaged.

Given my position as a research administrator and my interest in the phenomenon of faculty attitude and behavior toward indirect cost recovery on sponsored research projects, I have structured my study to concentrate on the faculty perspective. I will seek other research administrator's perspectives so as to confirm, or disconfirm, my experience in the field. But the focus of my data collection is on faculty informants. My justification is two-fold: First, a great deal of professional literature is devoted to institutional administrative perspectives on sponsored research, incorporated in association handbooks, Federal publications, and documented institutional policies. The requirements are well publicized at the Federal and institutional level. Faculty reaction to such requirements is anecdotal at best, comprised of the occasional letter from an academic committee to an institution's president, or a faculty blog complaining about the indirect cost rate, or a quote from a faculty member in the Chronicle of Higher Education. The academic literature regarding the faculty perspective on indirect costs is non-existent. Second, although policy frequently may differ from practice, I have had the opportunity to see both in action. I have been engaged in research administration at three different research intensive public universities. I have participated in many professional meetings where the realities of practice, as opposed to policy, are fully

discussed. My goal therefore is to balance the administrator perspective with the faculty perspective. I plan to interview successful research faculty in order to obtain their view of the issue. Given the dearth of faculty voice in the professional or conceptual literature on sponsored research, I believe my approach will allow that voice to be heard. In addition, I will rely on peer reviewers to help me address any potential over-reliance on my own unique administrator experience.

This chapter has explored the theoretical streams and conceptual themes guiding this study. Having presented the conceptual model, the next chapter will outline the research design and research methods used to explore the phenomenon of public research university STEM faculty perspectives on and response to indirect cost recovery on sponsored research projects. That design will incorporate and reflect the conceptual model and explain the basis for the methodological approach to the study.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

This study seeks to understand the perspectives of public research university STEM faculty regarding indirect cost recovery, and to explain faculty behavior towards the application of indirect costs on sponsored research projects. The primary research questions the study seeks to answer are: 1) what is the public research university STEM faculty understanding of indirect costs; 2) what is the public research university STEM faculty behavior toward indirect costs?

In this case, the key concepts of interpretive anthropology and of organizational culture theory serve as filters for the focus of the study and how the data are approached. The goal is to allow the informants to provide their own explanation for what happens, and their own understanding of what occurs. Theory is not a justification for pre-judging or predetermining the findings, but a way to manage the process and sharpen the analysis. For example, the interpretive anthropological concept of "thick description" (Geertz, 1973, p.6), is the process of capturing human activity and human explications with enough detail and context so as to be able to move beyond the merely observational and toward a sufficient and full portrayal of a phenomenon. "Thick description" assumes that even the most insignificant data can accrete to provide illumination into the tacit or deep meaning of the human behavior. The use of theory in structuring an ethnographic study is important because "there is no reason why the conceptual structure of a cultural interpretation should be any less formal, and thus less susceptible to explicit canons of appraisal, than that…of a biological observation or physical experiment" (Geertz, 1973, p. 24). This approach aligns with Yin's guidance for obtaining analytical generalizations in a case study; he states that "previously developed theory is used as a template with

which to compare the empirical results of the study" (2003, p. 32). Theory undergirds this study's research design and research methodology.

The following section outlines the themes drawn from the theoretical bases underlying the conceptual framework. The key variables of the themes are detailed, along with the indicators related to resources. These items of themes, key variables, and indicators, drive data acquisition and position potential answers to the research questions.

Components of the Research Design

Each of the organizing themes reflects this study's underlying theoretical and conceptual bodies of literature, incorporating organizational culture, faculty socialization, and political bargaining. These organizing themes of context, content, and contest include key variables and indicators that serve as potential evidence for each theme.

Organizational Culture/Context

The organizational culture of higher education attempts to address the *resource needs* it encounters, as it works to maintain its mission, its finances, and its goals and objectives. Markers for context and organizational culture will be: 1) informants' discussion of funding pressures from both the external and internal environments; 2) references to organizational policies and procedures that address resource needs; 3) explicit and implicit institutional priorities that specify how to handle resource constraints; and 4) institutional statements regarding funding issues. The resource needs focused on for this theme are economic, temporal, affiliation, and reputational.

Organizational culture/context key variables.

External environment*:* The complex external environment for higher education includes the broader political and economic landscape in which the institution resides; in the case of sponsored research in particular, the key external factors are the state government political and budgetary processes as they affect the public research university, and the Federal government agencies that both support research projects and attempt to restrict indirect cost recovery through statutory limitations and other mandates.

Internal environment: The key factors intrinsic to the institutional environment for sponsored research include research university mission, differentiation and decentralization of the units/departments, and complex internal resource distribution. Distribution of recovered indirect (F&A) costs is frequently an area of dispute.

Faculty Socialization/Content

Faculty professional socialization expresses itself in the way faculty value certain resources over others. In particular the manner in which faculty apportion their time, maintain their disciplinary reputation, and access institutional resources will indicate *resource values*. Markers of faculty socialization and content will be: 1) informants' discussion of faculty goals and motives; 2) references to the importance and impact of disciplinary connections; 3) institutional information exchange or lack of it; 4) perceived autonomy of faculty in acting on resource values; and 5) sense of collegiality and respect for expertise. The resource values focused on for this theme are economic, temporal, affiliation, and reputational.

Faculty socialization/content key variables.

Role success*:* Recognition and reward include status enhancers such as monetary or professional acknowledgment or critical goal attainment. Professional goals are related to the specialized role of the informants. For faculty these goals include the need to publish, based on research project results, in a discipline-recognized peer reviewed journal, frequently enough to meet tenure and promotion requirements.

Affiliation: Integration and acceptance into the community of choice; belonging.

Knowledge: Communication of critical information necessary to attain goals/mission/socialization; access to information, timeliness, completeness.

Political Bargaining/Contest

This theme is revealed by the *resource allocation* that occurs as a result of the intra-organizational decision-making process. Markers of political bargaining and contest will be: 1) informants' discussion of requests for waivers or reductions on indirect costs; 2) negotiations over budget items in proposals; and 3) expressed conflict over obtaining indirect costs. The resource allocations focused on for this theme are economic, temporal, affiliation and reputational.

Political bargaining/contest key variables.

Authority: Authority reflects the various types of power inherent in the university, in particular the expert power of the faculty and the managerial power of administrators; fragmentation of power structures and processes.

Actors: Position of individuals involved and their relative influence and efficacy.

Decision-making*:* Dominant patterns pertaining to obtaining and managing sponsored research; how conflicting needs and demands are negotiated or mitigated.

Drawing on the conceptual model, the phenomenon of public research university faculty attitudes and behavior toward indirect cost recovery on sponsored research will be examined through the lens of organizational culture in higher education, faculty socialization, and political bargaining. These lens are distilled into the notions of context, with a focus on resource needs; content, with a focus on resource values; and contest, with a focus on resource allocation. Each of these resource items serves as an indicator for a theme. Where resource needs are invoked, I expect to find context; where resource values are invoked, I expect to find content; where resource allocation is invoked, I expect to find contest.

Table 1 lays out the relationship of the research questions, key variables, indicators and data sources.

Table 1. Research Design

Primary and Secondary Research Questions	Key Variables	Indicators	Sources of Data
What is the public research university faculty understanding of indirect costs?	External Environment Internal Environment Role Success Affiliation Knowledge	Resource Needs Resource Values	Informant Interviews Institutional Records Public Documents
What is the public research university faculty behavior toward indirect costs?	Authority Actors Decision-making	Resource Allocation	Informant Interviews Institutional Records Public Documents
Does organizational culture/context help explain the public research university faculty understanding of and behavior toward indirect costs?	External Environment Internal Environment	Resource Needs: Economic Temporal Affiliation Reputational	Informant Interviews
Does faculty socialization/content help explain the public research university faculty understanding of and behavior toward indirect costs?	Role Success Affiliation Knowledge	Resource Values: Economic Temporal Affiliation Reputational	Informant Interviews
Does political bargaining/contest help explain the public research university faculty understanding of and behavior toward indirect costs?	Authority Actors Decision-making	Resource Allocation: Economic Temporal Affiliation Reputational	Informant Interviews

Do the factors of context, content, and contest intersect and interact so as to explain the public research university faculty response to indirect cost recovery on sponsored research projects?	External Environment Internal Environment Role Success Affiliation Knowledge Authority Actors Decision-making	Resource Needs, Values, and Allocation	Informant Interviews Institutional Records Public Documents

Research Methodology

This study relies on ethnographic research techniques from the field of cultural anthropology. This method is chosen because the goal of the study is to understand the beliefs and behavior of faculty in relation to indirect cost recovery on sponsored research. The ethnographic approach, as described by Spradley (1979), Goetz and LeCompte (1984), and Wolcott (1999), contributes directly to the description, explanation, and interpretation of regularities and variations in human social behavior. Ethnography always implies a theory of culture, the system of meanings that infuse and guide individual choice and participation in the social world. Utilizing an ethnographic approach allows the investigator to make cultural inferences from what people say, what they do, and how they do it.

The purpose of this case study is to understand the public research university STEM faculty perspective on and behavior toward indirect cost recovery on sponsored research.

The primary research questions the study will seek to answer are:

1. What is the public research university STEM faculty understanding of indirect costs?

2. What is the public research university STEM faculty behavior toward indirect costs?

The secondary research questions the study will seek to answer are:

1. Does organizational culture/context help explain the public research university faculty understanding of and behavior toward indirect costs?

2. Does faculty socialization/content help explain the public research university faculty understanding of and behavior toward indirect costs?

3. Does political bargaining/contest help explain the public research university faculty understanding of and behavior toward indirect costs?

4. Do the factors of context, content, and contest intersect and interact so as to explain the public research university faculty response to indirect cost recovery on sponsored research projects?

Research Methodology: A Case Study Approach

An ethnographic case study is chosen as the most appropriate method for illuminating these questions, given the following underlying assumptions:

1. The first assumption is that faculty response to and behavior towards indirect cost recovery represents values, beliefs, and choices drawn from the distinct professional socialization and distinct culture of faculty.
2. When faculty and institutional administrators are in conflict over indirect cost recovery, the resulting formal administrative decision comes about through political bargaining over critical resources.

A case study approach is appropriate when the goal is to understand complex social phenomenon while retaining the "holistic and meaningful characteristics of real life events" (Yin, 2003, p. 2). Case study illuminates a process or event in its particular contextual setting and is bounded by time and activity (Merriam, 1998). This study seeks to understand a phenomenon from the perspective of the informants; in this case public research university STEM faculty involved in sponsored research. As Merriam notes, "a case study design is employed to gain an in-depth understanding of the situation and meaning for those involved" (1998, p. 19). The goal in this instance is to unravel the nature of public research university STEM faculty response to indirect cost recovery on sponsored research projects. This type of inquiry, attempting to grasp the informants' view of the situation, does not lend itself easily to statistical or quantitative assessment. Instead, drawing on the traditional anthropological technique of ethnography, this study will employ an ethnographic approach in a qualitative case study. Focusing on informant interviews, bolstered by document review, the goal will be to obtain a rich, full and comprehensive description of what the informants understand about the phenomenon, how they interpret what happens, and why they make the decisions they do.

Site Selection

Given the sensitivity inherent in analyzing intra-organizational conflict as it relates to critical financial resources, obtaining access to essential data regarding such a phenomenon is a vital concern. The extremely limited number of studies related to higher education sponsored research funding or conflicts related to that funding appear to bear out this assumption. Therefore the choice of study site institution was based on

its typicality as a very high research intensive institution and on the capacity of the investigator to gain access to institutional data and to the research faculty. Much of the data related to sponsored research, particularly regarding unrecovered indirect costs, is considered confidential both by the universities and by the Federal government reporting agencies. Given that, familiarity with the site institution is both critical and cautionary; without familiarity, it is doubtful access to such sensitive information would be possible. Such familiarity, however, demands constant alertness and continuous reflection on the potential for subjectivity to influence my study, my data collection, and my analysis.

This study was conducted at a public research university located in the eastern half of the United States. This institution meets the Carnegie classification of very high research activity or RU/VH (Carnegie Foundation for the Advancement of Teaching, 2014). The financial data to confirm very high research activity was provided by the site institutions' 2010-2014 audited fiscal years, and institutional financial reports on sponsored research costs and revenue. In fiscal year 2011 (FY11), the site institution reported approximately $500 million in sponsored research funding, with 80% of that funding coming from the Federal government. The institution's negotiated indirect cost rate agreement (NICRA) is with the U.S. Department of Health and Human Services. The indirect cost rate for basic research during FY11 was 52%. The institution reported an indirect cost recovery rate of 27.5% for FY11, and reported approximately $65 million in indirect cost recovery.

Informant Selection

Informant interview transcripts provided the primary data for this study, and were bolstered by document analysis. The interview informants were tenured or tenure-track faculty who were active principal investigators in one of the STEM fields (science, technology, engineering, mathematics) with at least one million dollars in Federally-funded sponsored research awards during Fiscal Years 2010-2014. These individuals provided direct information and explanations of their behavior.

These faculty were selected through purposeful and snowball sampling techniques. Guidance on selecting informants was provided by Bernard (1988). From an initial set of active principal investigators, available through the institution's website and publicly available award records, contact was made via email to ascertain the principal investigator's interest in and willingness to participate in the study. From this purposeful selection of active respondents a request was made for suggested contacts of other principal investigators (snowball sampling) so as to ensure active investigators were included beyond those presented through promotional venues (website and award lists). The goal was to interview faculty members across a representative spectrum of academic departments. In sponsored research the majority of funding is for bio-medical (neurology, virology, genetics, etc.), and physical sciences (physics, engineering, chemistry, computer science). Every attempt was made to reach principal investigators across these representative units. In total 37 individual investigators were contacted. Of those contacted, 13 agreed to participate in the study. Two of those individuals subsequently were unavailable for an interview during the data collection period.

Once the purposeful and snowball sampling was complete I had a set of active principal investigators, with at least one million dollars in Federal awards, who were willing to discuss indirect costs on sponsored research projects. Interviews were conducted using open-ended and semi-structured questions, designed to elicit the informant's views of the issue. Follow up probes as outlined by Merriam (1998, p. 80) and Patton (1990, p. 324), and Murphy (1980, p. 75), were used to pursue lines of inquiry that might illuminate the research questions. The total sample size was 11 individuals. Given my involvement as both a participant and an observer in this setting, member checks were offered to ensure the credibility of the data, including transcripts of the interviews and drafts of interpretations. Informant feedback on these materials served as another layer of "thick description" of the phenomenon.

Confidentiality is critical in order to ensure informant anonymity. In addition to obtaining informed consent prior to conducting interviews, I offered informants the option to withdraw from the study at any time and have their data removed. All interview transcripts were securely maintained solely by this investigator and stored in an encrypted digital file. All informants were coded numerically and de-identified in the document record. References to informants in the study are neutral, i.e., only using appointment information such as assistant professor or associate professor, and identifying disciplinary areas for the most part, rather than specific departments. The information regarding departments and award history gathered in the interview process is used for aggregate analysis and not reflected when quoting individuals in the research findings. The only exceptions are those instances where reference to a specific department is part of the verbatim account provided by the informant. In those cases I

chose to keep the informant voice whole, while making every attempt to minimize any other identifying information.

Informant Pool

My goal in seeking informants was to reach STEM (science, technology, engineering, and mathematics) tenured and tenure-track faculty who had at least one million dollars in Federal sponsored research awards during fiscal years 2010-2014. The focus on public research university STEM faculty reflects the predominance of STEM fields as recipients of Federal government sponsored research funding (National Science Foundation HERD Survey, 2012). Approximately 80% of Federal basic research funding nationwide goes to the STEM disciplines. That holds true at the site institution for this study, where 80% of Federal funds were directed to STEM fields during fiscal years 2010-2014. These STEM faculty were assumed to have the expertise and experience necessary to help me understand the faculty perspective on indirect costs.

In addition, only tenured and tenure-track faculty were selected for this study. The focus here is on the traditional faculty professionalization path, from doctoral student, to Ph.D. recipient, to assistant professor, and finally to tenured associate and full professor. These are the individuals who are expected to fulfill the mission of a public research university, and the concomitant obligations of teaching, research, and service. Many public research universities today have bifurcated faculty roles, which split off teaching duties onto contingent and adjunct faculty, and research duties onto faculty research associate positions that are non-teaching and not on faculty lines, i.e., are fully grant-funded or on “soft” support (Schuster & Finkelstein, 2006). Despite these changes

in faculty positions, I wanted to be sure to reflect the professional trajectory of tenure line faculty, who so far as the data reveal still receive the majority of sponsored research funding.

The dollar threshold for Federal sponsored research funding is based on the "gold standard" of the National Institutes of Health major basic research grant, called the R01. The National Institutes of Health (NIH) is the top U.S. Federal agency underwriting basic research support, providing more than $30 billion dollars in fiscal year 2011. The NIH is the largest funder of basic research in the world, although the Chinese government is on track to surpass it (Moses, 2015). Bio-medical researchers begin their professional research careers seeking to obtain an R01, which typically provides $250,000 a year in research support, or one million dollars over four years (National Institutes of Health, 2015). The National Institute of General Medical Sciences at the NIH has conducted studies indicating its most productive award recipients, as defined by cited publications, have over their careers an average of between $1.2 million and $2.7 million in Federal research funding (National Institute of General Medical Sciences, 2010). This typical level of funding, related to productivity, was subsequently confirmed by a statistical analysis of 20 years of NIH funding data (Jacob & Lefgren, 2011). I therefore decided to use the minimum threshold of one million dollars in Federal sponsored research support, over four fiscal years, as the standard for determining whether a potential informant was a highly successful principal investigator and experienced grant recipient.

Total Federal sponsored research funding for my informants, as confirmed by institutional records, was $46 million dollars over four fiscal years, from 2010 to 2014.

The range of total award amounts per informant ran from $1 million to $8.9 million, with a median of $3.2 million. All of the funding for all the informants fit the category of basic or fundamental research; none of these principal investigators conducted applied research during the period under study. This predominance of basic research aligns with institutional records, which indicate that 72% of sponsored research awards from 2010 to 2014 were for basic research. Only 9% of sponsored research funding during that time supported applied research, with another 9% funding service projects and 3% funding training awards. With the exception of one assistant professor, all of my informants were tenured associate or full professors, and included one associate chair, one chair, one center director and one distinguished professor. The median length of time since receiving the doctorate was 20 years, with a range from 10 years to 39 years. The range of disciplines represented include chemistry, physics, virology, molecular biology, immunology, mathematics, plant science and public health. Eight of my informants are Caucasian and three are Asian (including East and South Asian). Eight of my informants are male and three are female. Five of my informants are foreign-born. Nine of my informants run a laboratory as part of their research portfolio. The dominant Federal funding agency for my informants was the National Institutes of Health, closely followed by the National Science Foundation, and also included the U.S. Department of Energy, the National Aeronautics and Space Administration and the U.S. Department of Agriculture.

Interviewing

Open-ended questions were used to discover major issues as seen by the informants; follow up semi-structured questions were used as necessary to expand and

confirm topics. Guidance on conducting ethnographic interviews was provided by Spradley (1979), Murphy (1980), Patton (1990), and Wolcott (1999). Following their guidance a developmental sequence was utilized: beginning with "grand tour" descriptive questions and background questions, leading to domain defining structural questions (i.e., from "telling me what you know" to "tell me why/how you do something") to contrast questions ("which would you choose in x case?). Follow up probe interview questions incorporated the themes and key variables as identified in the conceptual framework, i.e., organizational culture, faculty socialization, and political bargaining.

Permission to digitally record the interviews was asked of every informant. An interview debrief journal was maintained as close to the interview session itself as possible. The key to immediate recording and to journaling was to reduce the influence of the ethnographer's "translation competence" (Spradley, 1979, p. 71), the ability to condense, summarize, and make more familiar the responses of others. Every attempt was made to keep the informant's language accurate and whole. The interview protocol, contact email, and consent form are provided in Appendix A.

Documents and Reports

Financial reports and accounting records on sponsored research were the primary document data sources. This information is considered sensitive and confidential by research universities. For example, the National Science Foundation's Higher Education Research and Development Survey (HERD), formerly the Survey of Research and Development Expenditures at Universities and Colleges, mandates annual reporting of all research and development expenditures by source of funds. Higher education

institutions having more than $150,000 in separately budgeted research and development activity are required to detail the funds originating from the Federal government, state and local government, business, nonprofit organizations and their own institutional funds. Institutional funds consist of institutionally-financed organized research (often called seed grants or start-up grants), cost sharing, and unrecovered indirect costs. On the National Science Foundation HERD survey instrument these institutional funds are marked as confidential and are the only source of funds that are aggregated and not broken out in the final report by individual institutions (NCSES, September 2012, p. 397). This information is not easily accessible but is vital to understand the impact of faculty and administrator conflict over indirect cost recovery.

After several months, I negotiated access to one research university's institutional raw data, provided in Excel format. These data included the 944 financial reporting system accounts that indicated non-standard indirect cost recovery on Federally-funded sponsored research during FY11. These accounts represented roughly 40% of the total Federally-funded sponsored research awards active during FY11. After determining the records that clearly indicated a sponsor-mandated restriction on indirect costs, I conducted an analysis of each remaining individual account via electronic record retrieval and physical review of the legal file, which was necessary in order to ascertain the basis for the non-standard indirect cost recovery on each project. The goal was to determine what percentage of limited indirect cost recovery was the result of sponsor restrictions and what percentage was the result of faculty request for waivers of indirect costs on their sponsored research projects. Analysis of 454 individual records indicated that 17.9% of the Federally-funded non-standard indirect cost recovery accounts resulted

from faculty waiver requests. This finding confirms that faculty requests for waiver of indirect costs is a consequential factor in institutional indirect cost under-recovery, albeit not the primary cause. In addition, requests for waivers of indirect costs can be seen as a proxy for the broader phenomenon of faculty response to and behavior towards indirect costs. Given the formal process and additional time and effort required to make a waiver request, this study assumes that taking such a step is the most significant response to indirect cost recovery. Other subtler responses, such as choosing off campus facilities or classifying procurements as subcontracts, were less obvious but still effective techniques for reducing the indirect cost burden.

In addition to the fiscal records, focus was on corroborating evidence found via primary documents. Guidance on document gathering and analysis in a case study was provided by Merriam (1998) and Yin (2003). The administrative policies, procedures and guidelines related to sponsored research are voluminous. These source materials served as primary artifacts (Merriam, 1998, p. 113) for content analysis explaining the administrative mandates and sanctions as they pertain to sponsored research. Documents were gathered from the site institution and from the Federal entities that oversee compliance in sponsored research.

Another source of materials to illuminate the dynamic of faculty and administrator involvement in indirect cost recovery consists of the institutional policies and procedures that govern the responsibilities of faculty as principal investigators overseeing sponsored research projects, and administrators as authorized institutional officials. The legal obligations, technical and financial, inherent in receiving sponsored research funding are significant and explicit, as outlined by the Office of Management

and Budget (2004). Assessing faculty and administrator understanding of these responsibilities, alongside the fiscal management of sponsored research awards, helps to build the case regarding the relative roles of faculty and administrators in indirect cost recovery.

Reliability and Validity

The trustworthiness of case study research depends on its rigor and reliability, what Yin calls its "logical model of proof" (2003, p. 34). That logical model of proof connects the logic of the design, the logic linking data to propositions, and the logic of the analysis. As Goetz and LeCompte also note, "credibility mandates that canons of reliability and validity be addressed whenever ethnographic techniques are used" (1984, p. 210). The following measures were employed in order to enhance reliability and validity.

External Reliability

External reliability addresses replicability in the scientific community. Would another investigator see the same problem or conceive of similar themes? One way to assure external reliability is to clearly identify the researcher's position as a member of the group being investigated. Also called disciplined subjectivity, this approach clarifies the investigator's involvement with the phenomenon of interest. In this case, my experience as a research administrator is offered to help avoid bias. I also attempted to address this concern by frequent journaling, invoking member checks (reviews of data by the informants), and using peer review to bracket and contain my own involvement in the phenomenon.

Another way to confirm external reliability is the use of operational concepts defined prior to data collection (Yin, 2003). These operational concepts are incorporated in the conceptual model used for the study. In this study, the use of themes drawn from the literature, key variables connected to the thematic constructs, and indicators seen as reflecting those variables, serve as operational concepts.

A final way to enhance external reliability is to use data collection techniques that were outlined prior to conducting the study. These techniques are outlined later in this chapter.

Internal Reliability

Internal reliability concerns the logical link between data and conceptual framework. Would another investigator agree with the connections made between the data and the themes? One method to ensure internal reliability is to keep the focus on the raw data and rely on the verbatim accounts and interview transcripts to provide the connection to the concepts (Goetz & LeCompte, 1984; Wolcott, 1999, 2001). The investigator must also continuously track any discrepant data and be prepared to address alternate explanations. Using peer reviewers to assess the dependability of the process and approach is another step for increasing internal reliability. Finally, careful maintenance of recorded data and a thorough documentation of procedures used in data analysis allows other investigators to follow the logical link between data and concepts. I used all these techniques in order to enhance internal reliability.

Internal Validity

Internal validity is closely linked to internal reliability, but particularly emphasizes authenticity. Does the conceptual framework represent real world problems, and does the research design effectively account for the phenomenon? One key method for ensuring internal validity is the constant consideration of rival explanations (Yin, 2003) in order to avoid spurious conclusions. This consideration of alternative answers must be an ongoing process, through inception of the research study to the concluding analysis. I continuously entertained alternative explanations for the phenomenon, and in particular looked to discrepant or unexpected data to suggest alternate conceptual considerations.

Another critical method for enhancing internal validity is the convergence of multiple sources of evidence, otherwise known as triangulation (Yin, 2003; Merriam, 1998). Over-dependence on one type of data weakens the analysis; multiple types of data arriving at the same point strengthen it. I intentionally bolstered the predominant data source, the informant interviews, with institutional documentary data, as well as a continuing review of the related literature.

A final approach to internal validity was to have key informants review transcripts and analysis, also known as member checks or respondent validation (Stake, 1995). Their response confirms whether an authentic representation has been achieved or not.

External Validity

External validity concerns whether the conceptual approach and findings of the study apply to any other situation or setting. External validity is a particularly difficult issue in qualitative research. Some question whether generalizability can ever be derived from qualitative research (Merriam, 1998, p. 207). Others make a distinction between experimental generalizations and what some call naturalistic generalizations (Stake, 1995) or analytical generalizations (Yin, 2003). Essentially, external validity requires some degree of comparability and translatability beyond the case at hand.

No one approach ensures external validity; instead, addressing the other concerns of external and internal reliability, and internal validity, helped build the case for external validity. Making explicit the stance of the investigator, setting out the logic of the research design and conceptual framework, maintaining the accuracy of the informants' accounts, attending to the possibility of observer effects, and acknowledging rival explanations are all elements for achieving external validity. Anything that might compromise the data and its analysis needs to be considered. All these techniques were incorporated into my study.

Construct Validity

Construct validity relies on the power of the conceptual framework to extend beyond settings, time, and populations (Goetz and Lecompte, 1984, p. 230). One way to achieve construct validity is to demonstrate that research measures truly reflect the phenomenon and link conceptual factors to study objectives (Yin, 2003, p. 35). In addition, sufficient evidence and rigorous analysis may build conclusions that can

expand theory and present analytical generalizations (Yin, 2003, p.10) applicable to other phenomenon. My conceptual framework was constructed so as to attempt to capture the fundamentals of the phenomenon and derive some insight into informants' perspectives on the phenomenon. If the analysis holds, then it may indeed have utility beyond the phenomenon at hand.

Having described my research design and methodology, and my strategies for achieving reliability and validity in that design, I now turn to data collection and analysis.

Data Collection and Analysis

Data collection and analysis, while an iterative process, still followed a predominantly sequential pattern. Interviews were conducted over the course of one month; each interview was undertaken in the informant's campus office, during regular business hours, with the time and location entirely at their preference. After transcribing the interviews, the transcripts were analyzed alongside other documentary evidence from institutional and financial records.

Data Collection

Data collection was dependent on informant interviews and document analysis. Attention was paid to Merriam's caution, that the "results of research are strongly influenced by the characteristics of the data revealed, concealed, or altered because of the nature of the medium through which they are presented" (1998, p. 130). To that end this investigator aimed for accuracy in informant reports, along with saturation of data

elements from all sources, i.e., the repeated, consistent accumulation of confirming evidence.

At the end of my interviews with my 11 informants I had 10 digital recordings and one written recording. One of the informants preferred not to be digitally recorded; in that case, I took extensive notes during the interview. The 10 digitally recorded interviews lasted between 50 minutes and an hour, for an average of approximately 55 minutes. The one unrecorded interview lasted approximately an hour and a half.

I spent roughly 60 hours transcribing the digital interviews, producing 120 pages of transcript. I also compiled an excel spreadsheet to record the demographics and backgrounds of my informants, and used numerical identifiers instead of individual names to guarantee anonymity.

My informants' remarkable generosity surprised and impressed me during the data collection process. This highly successful group of principal investigators, all with multiple obligations including research, teaching, and publishing, still offered some of their extremely limited time to discuss indirect costs on sponsored research with me. These faculty revealed their perspective on indirect costs and their choices regarding indirect costs, and in doing so, displayed profound concerns about their professional world.

Data Analysis

The ethnographic approach presupposes a goal of obtaining the informant's understanding and interpretation of the phenomenon at hand; this is the emic account (Harris, 2001). Therefore every attempt was made not to constrict, guide or covertly

influence the informant's response. Even so, theoretical constructs were important to shape the approach to the study; these were the researcher's or observer's guide to the phenomenon, called the etic account (Harris, 2001).

After the 11 transcripts were consolidated into a 120 page document, I licensed NVIVO, a qualitative data analysis software package, and entered the data to begin my analysis. Using my conceptual framework, I entered my themes, key variables, and indicators as nodes. I then searched through the data to ascertain whether or not my themes, key variables, or indicators emerged from my transcript record.

This concept driven coding determined whether an alignment could be found between the informants' understanding and the researcher's conceptual framework. Using the conceptual framework as a guide, the themes were set against the corresponding key variables: external environment, internal environment, role success, affiliation, knowledge, authority, actors, and decision-making. These variables were arrayed along the indicators of context and resource needs, content and resource values, and contest and resource allocation. The assumption was that the key variables would reflect and illuminate the conceptual model and confirm, or disconfirm, the viability of the organizing themes.

The next chapter reports findings from the data analysis described above.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this study was to illuminate the perspectives of public research university STEM faculty regarding indirect cost recovery, and to explain faculty behavior towards the application of indirect costs on sponsored research projects.

The primary research questions the study sought to answer were: 1) what is the public research university faculty understanding of indirect costs; 2) what is the public research university faculty behavior toward indirect costs?

For question one, my findings indicate that faculty understanding of indirect costs is incomplete, superficial, and limited. Institutional information regarding indirect costs is constricted, as is faculty time, which contribute to weak understanding.

For question two, faculty behavior toward indirect costs is basically instrumental, barely accommodating, and rarely confrontational. Faculty response to indirect costs is premised on their belief that it isn't usually worth their time or effort to address indirect costs.

Findings

In this section I describe the findings derived from the informant interviews, and categorize those findings by the themes invoked. I lay out the dominant findings from the interview data in descending order, from the most discussed themes and variables to the least mentioned. This process arrays all 18 of the conceptual model elements by the frequency with which they are referenced by the informants. I then provide an explanatory model derived from the NVIVO coding and the absolute frequency

numbers. That model arrays the conceptual model elements by the organizing themes and their related variables and integrates the findings with the original conceptual model. That explanatory model is presented as Figure 3.

Theme: Faculty Socialization

Faculty Socialization turned out to be the dominant theme emerging from the informants. They spoke at length about learning what it means to be a STEM faculty member, and about understanding what it takes to stay on the tenure track. For the faculty, the story is not so much about resisting or avoiding indirect costs, or about political bargaining over grant funds. It is about the struggle research scientists in STEM face trying to keep their research programs afloat. As one associate professor of immunology noted:

> When I was a post doc, I thought of the faculty position as kind of the heaven of science, you don't have to worry about money; you have people working for you, you have facilities and stuff. That's your dream, to be concentrating on the science. I was a post doc for four years and during that time I didn't have to worry about anything. I had money supporting my work, my PI was famous and he had plenty of money, and mice, and reagents, and people in the lab. I just focused on the science. I said, I want this life. I did not realize how much work was behind the screen. How to get money, how to get the mice, how to support so many people. Then when I got my faculty position, I started to worry too much. I thought, whoa, I never had to think about this, how to re-modernize my lab, how to purchase equipment, and how to get money. Because the start-up

> package is just for three years, and then, well, the first year is fine, then the second year is pretty good, but in the third year your start-up funds are winding down. The support goes down from the department, just as the lab is gearing up and you need money.

Complaining about indirect costs is a side note. The faculty are sophisticated enough to know that some amount of indirect or overhead is necessary. Their response to indirect cost recovery relates to the utility it brings. The "wet lab" scientists – those who are running an experimental laboratory requiring specialized equipment, supplies, and technicians -were more accepting of indirect cost recovery than the "non-wet lab" (primarily computer dependent) scientists. It's all part of the complex grant management and grant seeking that underwrites their research agendas. The faculty focus is on maintaining their research portfolio:

> So I would say, my appointment is 80% research and 20% teaching; the 20% teaching, I still go out there and do my job and teach. But the majority of my time is spent thinking about my research program, how am I going to do it, where are the funds going to come from, how can I keep my lab running?

That research portfolio is the most critical component in staying on the tenure track and successfully achieving tenure, as an assistant professor in genetics stated:

> My goal in getting money is because I want to get tenure. A lot of grant seeking is predicated on that. And even so, a colleague and I always talk about how we're not concerned about getting tenure, what worries us is about being able to run the lab. Being able to pay the people to do the work, to do the research.

> Tenure is like the icing on the cake. If you do all of those other things, you're going to get tenure, because you're trying, you're doing these things, you're running your lab, you're publishing papers. So that's the key. That's the important thing. Tenure is great, I can't wait to get it, but I have to think about all these other things, that are equal, if not more important. And once you have tenure, it's not like all that goes away, it's the same if not taken to a heightened level. They're just going to ask you to be on more committees, you'll have even less time to be in the lab, or to write. It's always the same.

Part of STEM faculty socialization is not only understanding the necessity of grants for their research programs and career success, but also learning what the actual process is for seeking grant funding. That learning curve can be a difficult one, as an associate chair revealed:

> If I look at my own history, this is my eighth year here, before that I had seven years at Stanford, so I found myself a tenure track assistant professor at Stanford. I came there after spending two years at Berkeley and one year in Paris as a postdoc, during which time I was not involved at all in any grant writing. They paid my full salary, they never asked me to participate in any grant writing or anything. They never even showed me a grant. In fact I ended up in a position as an assistant professor not even knowing what a grant looks like. That's really how the whole thing started. I submitted my first NSF grant proposal that first year at Stanford, and looking back at it, I have everything, it's really so poorly written. I made so many silly mistakes. Like, I'm a young assistant professor, here I'm asking for tens of thousands of dollars in equipment, to do I really don't

know what. Of course I didn't get it. Then the following year I said, I must be able to figure out this grant writing thing. I mean, again, I had no training, no mentoring, no nothing, but what I did was, I told myself, I'm going to apply for an NSF CAREER grant. I took the program solicitation and I dissected it word by word and I figured out how to write the proposal to actually answer every single thing they were asking for. And that was the first proposal that I was awarded, my NSF CAREER award.

STEM faculty socialization means you are constantly juggling the writing of grants and the writing of papers, but those two can be complementary, as a distinguished professor of physics outlined:

> Let me comment on the grant seeking. There are a couple of very important things for anybody who is involved in research. One is writing papers, and the other is applying for grants. Both of those help focus the mind, because you have to articulate clearly what you have done, what the importance is, and both of these things, whether it is writing a paper or applying for a grant, forces you to think carefully about what you're doing, why you are doing it, and what your strategic plan is. And so I would say that is the most important positive thing I get out of writing grant proposals. There are a lot of negative things, like time spent, that sort of thing. But the positive aspect is it really helps you focus on where you're going, what you're doing, what you've accomplished and how to articulate it, which is also really important.

Although the time devoted to grant proposal writing can be burdensome, it can also provide the framework for the research project, and the confirmation that the approach is valid, according to a department chair:

> I think the process of writing a grant isn't necessarily a bad thing, it forces you to formulate your thoughts. You do plan it, there's probably more planning for the experiments when you're writing the grant than when you get the award. If you're successful, it's the ultimate peer review system.

Another faculty informant expressed a similar thought:

> Generally speaking I think that writing grants is a good exercise, it allows you to solidify your ideas, to think, to plan your research. You invest a lot of time in trying to describe everything in the right words, the right level. So it has a lot of positive aspects to it.

Even though grant writing and research paper writing may support each other, the relentless pressure to bring in funding, and the anxiety when funding lags, is constantly on the STEM faculty radar. As a biology professor detailed:

> It's incredibly stressful. My NSF grant ended in June, and I had known for the entire year before that that I was running out of money. So I let people go, I didn't take on any new students, because if I don't have funds to support people for x number of years, then there is no point getting them started. And then, miraculously, I found out the next grant from the NIH was going to come through. And suddenly, the sun rises, everything is o.k. It's incredibly stressful.

Successful faculty gradually learn that having a funded award does not provide any respite from planning for the next funding request. An associate professor of molecular biology spoke about coming to that conclusion:

> Because I went through this year funding gap, it woke me up to the realization that I can't ever stop scrambling for money. When I had this five year NIH grant, it was so nice, it was ah, for five years I have all the money I need, I'll just do science. That wasn't bad, but it was like Rip Van Winkle, when I woke up the world had changed. It wasn't easy to get money anymore. Not that it was ever easy, but now it wasn't even straightforward to get money. So I feel like I should have spent some of my time in those five years writing more grants.

Faculty also discussed their concerns about the stress of their profession, both on themselves and their colleagues. A chemistry department chair noted:

> This is true of every science department in the country, if you want to do research, you can't do it without resources. So you're pursuing these scholarly areas, obviously you're doing them because you think they're important and you want to have impact on them, but they are also a venue for training of students. In our discipline you couldn't have graduate students, you couldn't have research without funding, [research] is not cheap to do, so if you are unsuccessful at getting funding, well... University environments are difficult environments to work in, you are constantly being judged as a scholar, so if you don't have funding, and you can't do research, then you've become like a lower class citizen in the department. I think it would not be very comfortable to be that. So right

> now in our department, all the faculty members strive to be funded, and if you're not funded, things will happen to you. There will be repercussions.

Faculty were also deeply aware of the toll constant research funding pressure takes on their other obligations. One associate professor spoke about what he sees happening in his college:

> I think this is where I see this situation becoming brutal. I think the expectation on assistant professors is to be superstars. You can do that, but you either lose them because they don't get tenure, or you lose them because they burn out early. And so I think it's a question of institutional support, how do you encourage younger faculty to be successful but not necessarily to overachieve, too early, because they also need to teach well. Which is also part of their job responsibility but which unfortunately gets sacrificed, a lot. It's finding that balance, that institutional balance as well as a personal balance, those are the questions I think about a lot.

STEM research faculty often wondered if anyone outside their field understands how the research world works:

> When you think about what a faculty member does: What if you superimposed the academic model on corporate America? Well just imagine, you write your own grants to get your own money to do the work, you do the work, you then write it up, and you submit it to peer review? Do you think corporate American would survive a week? I could imagine on the other hand that starting a small

> business is a very similar model, very analogous. You put out a product, it tells you right there, that's your peer review.

Faculty speculated on the future of STEM fields, and how much the landscape has changed around them. An associate professor of molecular biology gave his view of the future:

> I think the definition of what a lab looks like is going to be a leaner vision than it was ten years ago. Instead of having four or five grad students and a couple postdocs I think the typical lab is going to have two or three grad students and one postdoc, if any. So we're all kind of downsizing our vision of what we can do. For me that's still o.k., I've got two little kids at home, I don't have unlimited time to work, so three people full time is probably enough to keep me busy. But I guess, what's the bigger motivation of all that? It's to discover things that are interesting and put them out there, ultimately writing papers that we hope that will make a difference in the field. That's the currency of success that really matters. I've always regarded grants as a means to an end, not as an end in themselves. If I could do the work without the grants I would just do science all the time.

Faculty wondered if the professional path they followed in getting their STEM graduate degree will continue to exist:

> I think there is a feeling that long term the job market for Ph.D.'s in science is worse than it used to be. When I was going through grad school, you came out of grad school with all these different options. You could go to an academic

> postdoc and follow that academic route, or you could get a job in industry, or you could get job in government, everybody was hiring. It didn't matter what you wanted to do, you could do it. So the idea was, say, the default was to be an academic, because that was what you knew and that was what your advisor did, so that was your model. But you could always go to industry if that doesn't work out. Now all the pharmaceutical companies are closing down their research and development units, there's been massive hemorrhaging of jobs in the bio-medical corporate sector, and I feel like there's not that many jobs in industry any more. So everybody's contracting at the same time. So what do these Ph.D.'s do? Yet, at the Federal level, you keep hearing that it's important that we keep sending more kids into STEM. There is a real disconnect.

Faculty spoke about having to monitor the focus of Federal funding priorities, and adjust accordingly, as one chemistry professor articulated:

> I've had to really change, and it's been painful. You start out as a young faculty member in a certain research area, and maybe your research area you are in is initially considered a hot area. So there's a lot of funding that's available in that area. I've had situations where, I used to be funded through NSF in this group called surface and analytical chemistry, and I thought of myself as a surface chemist. And basically they dissolved the whole subfield, suddenly it was too old fashioned, they didn't want people doing it anymore. They renamed it. I had to really think about what I wanted to do. I didn't really change my [approach], to some extent, not that much what I'm doing, but I had to really cast it very differently, so that I could continue to fit into what their areas were.

Faculty also spoke constantly about the changes in grant proposal success, and the declining funding for basic research:

> I think the only thing we all agree on is that the probability of success has gotten so ridiculously low now that it's very disheartening. I think it's going to discourage otherwise really smart people from going into research. I feel like there's been a cold shower over the basic research world in the last ten years. When I first started I was trying to convince pre-meds to go into research. I'd say you're smart, don't go into medicine! Now I say, go to med school. Get paid.

Faculty noted that shrinking research funding, along with limited tenure track opportunities, has altered their view of academia. One professor looked back over decades of successful research funding, and reflected on the current state of grant success rates, noting:

> I feel like I'm getting close to retirement, I have a grant and this may carry me through to my sixties, maybe I'll never have another one. But I have a daughter in graduate school, and what do I tell her? Should she go into academia or not? It is a total waste in some respects to me.

Theme: Organizational Culture

Organizational culture was invoked nearly as frequently as faculty socialization, and thus follows very closely on faculty socialization as a predominant theme. Faculty attitude towards indirect cost recovery represents one small issue in a large, complex institutional environmental picture. Faculty link indirect cost recovery to their sense of

whether or not they receive critical support, or even appreciation, from the organization for bring in the funding. One highly successful professor in biochemistry gave his story:

> Originally I was thrown in, and I was told to teach two new courses. There was no template. So I had to put together a syllabus and everything, and that took up a bunch of my time. And I was still expected to bring in all the funds. This is something the humanities guys on this campus have no idea, even though they are Provosts and Associate Provosts on this campus, they have no idea what we have to go through. I'm facing this, I don't even think the Faculty Affairs group even understands this, on this campus. They talk a lot about science, but none of them have actually gone through this process, day in and day out. I've realized that more and more here in the last six months.

Faculty are fully cognizant of indirect costs but don't feel fully cognizant as to how the organization uses the indirect costs that are recovered:

> I don't understand indirect costs. And I don't know where my 52% goes. I was a postdoc at Washington University in St. Louis, and when I came here this university did not know what a K award was [an NIH career development award]. I was the first one to bring one here. And K awards have their own F&A rate. I don't know where my F&A goes. I have to empty my own garbage can, I have to vacuum my own office. Our lab has to take care of its own garbage. We have to mop our own floors. Walk down the hall, the lights are off. I bring in a huge amount of indirect, I'd like to know where it goes.

Scientists also made clear they don't have the time or energy to waste on analyzing indirect cost recovery:

> To be honest, I don't see any promotion of indirect cost policy. I think it is seen as a necessary evil by a lot of people. Rather than promotion, I think there is an attempt to explain where the money goes, to kind of clarify, like for your hundred dollars of overhead, this is how it gets parsed up. I've been to a number of faculty meetings where that's been explained. I guess you could call it promotion in the sense that maybe they thought if you are transparent about where the money goes people will appreciate the whole system more. So I guess I don't really see a distinction because it's not like the faculty are asked, do you think we should change the whole way we do it. It's sort of seen like, these are the rules, this is the system you have to play in, here's how it works. There is an attempt to explain but we're rarely asked if we think it's the right system. And frankly I'm o.k. with that. I think that is what administrators are paid for, is to sweat those details. I mainly care, especially as an NSF funded researcher, the overhead not go to like 90%. I need enough money in the direct costs to do stuff. Most of us look at the overhead rate, and we note it and work accordingly.

Instead, faculty see indirect cost recovery as a kind of symbol, part of the generally opaque and mystifying budgetary process that goes on at higher levels in the administration. The budget decisions land on them in the middle of everything else they do as tenure line faculty: teaching courses, managing a lab, managing a grant, publishing articles, mentoring graduate students. They don't understand how financial resources are

allocated because it isn't made truly transparent, for reasons they don't know but guess at, as one associate chair did:

> No I don't understand indirect costs. Let me tell you what I don't understand. What I do understand is the formula, how it's calculated. What I don't understand is, where is the money? In fact, my famous story about that is, I think it was three or four years ago, they have these beautiful brochures about research here. We all receive them, and I see they announce, they are very proud that the total amount of grants received increased from $400 million a year to $500 million a year. So I look at this and say, so what does this mean? The way I understand it is that researchers at the university received a $100 million more than the year previously. So there's a $100 million, of course we know how grants writing works, you cannot exactly build on how much you might get every year, but still, this $100 million should have generated approximately $30 million in indirect costs. These $30 million dollars could not have actually been planned for, so I look at this, and average it because of course some grants get lower indirect costs than others, but still, an average of $30 million no one actually planned for is showing up on campus somewhere. My question was, where's the money? So I asked the chair. And he laughed. And we asked the Dean. Basically no one knows the answer. Everyone has a theory but no one has the answer. It didn't go up to the Provost. Today maybe I would ask the Provost. Where's the money?

Not only is the allocation of recovered indirect costs unclear, but whether it actually is used to support research is also called into question, in this instance by a department chair:

> My understanding of [indirect costs] has evolved over time. When I first came here, I just sort of accepted it as a tax. I think basically there are different ideas, well, I'm a Democrat, and I almost approach it the same way as that. When I first came I thought, or I understood, there was this thing called indirect costs, it was siphoned off your grant, and you should minimize it and try to avoid paying indirect costs if you can. So in terms of certain instruments, how you should pay for what, you'd give a little thought to that. Now it didn't bother me, when I first came here I thought our indirect rate wasn't as bad as some places, so I thought maybe that was one of the good things about being at this university. I'm not resentful of the fact that we are paying overhead, I'm resentful of the fact that the overhead we are generating is going more into educational initiatives rather than research.

STEM faculty echoed that concern:

> Especially our new administration, they are putting a lot of money into things, like the entrepreneurship institute and the international center and the teaching-learning center, that are neither research nor teaching. It's some education type thing for students. All these sort of initiatives are coming down the pike. Nobody tells you where the funding comes for those, and considering how much funding

is going for the education of students, one can only conclude that the research overhead, the return is being cannibalized. That's what everybody thinks.

Many STEM faculty are left to speculate on the utilization of the indirect cost recovery funds by the institution, as one biology professor did:

> I know we get a fixed amount but I couldn't tell you, it's like 10% of 10% of, I don't know. There are some things that in theory we are not supposed to put on grants, so there's supposed to be this recovered money to cover that. Like computer supplies, things like that. There's this other issue on this campus of these centers, so some faculty are part of centers and some are not, and there are these new centers being proposed. I worry a lot because what that does now is, yet again, it takes money away from the departments and puts it someplace else. Which in theory does something good for somebody, but now there's all [this complexity], our university is just so many Venn diagrams that don't always overlap. It's a question of, it's too complicated where all the money is going, such that, certain people probably never have access to funds and other people probably have access to lots of funds. There seems like an equity issue there.

Several STEM faculty were also frustrated, not only by the lack of clarity, but by the shifting policy pronouncements regarding institutional research funds:

> I tried to save some of my start-up funds to fill in some of these gaps. But then the University decided we needed to spend down these institutional funds, because they thought the state legislature was unhappy with us carrying balances. But now apparently they want us to get our balances back up again, because

somehow that helps the bond rating of the state. I wish they would just pick an opinion and stick with it. And so if you feel like you've got these monies but suddenly the Dean is coming to faculty meetings and saying well, if you don't spend it, we're going to take it away, that's not a good scenario. How are we supposed to cover those gaps?

Faculty do appreciate when they have support, whether from departmental or central administration, in managing their grants and funding. As an associate professor of immunology described it, such support can be invaluable in saving faculty time and effort:

> We have a wonderful team in the department, the business manager and the pre-award team who work on the proposals. They are so careful. They pick up on so much, the format, the budget. I just write it, you know, I have a good idea, I'm not paying attention to the format. Sometimes there are format problems, for example, I had a Word file, couldn't fix lines, I spent one hour trying to fix it and got frustrated. I sent it to them, they fixed it right away. That support is wonderful. Then the department chair [is supportive], like in hiring personnel when people leave. You train people as much as possible, but then they go. Sometimes I went to the chair, he can give a little more money so I can hire another person for the lab.

Many faculty noted that they simply don't have time to keep up with funding agency changes, and rely on administrative support for help, as an associate professor of molecular biology stated:

> I think we're lucky in our department in that we have a fairly competent staff support system that helps us deal with some of the mind numbing bureaucratic minutiae that are not only mind numbing and bureaucratic but that are also constantly changing. The way you fill out a budget for the NSF, three years down the road it's not the same anymore. Whatever you might have learned, is not applicable the next time you need to do it, so having a full time person in the department who is basically paid to keep up with all that, is huge, and has greatly reduced the costs we would otherwise incur.

Faculty especially appreciate support, given they have to be managers as well as scientists once they have an award. An associate professor of plant science explained how critical that learning curve was in managing his complex, multi-institutional project:

> More importantly, as faculty, typically we don't necessarily have the knowledge or the skills to be good administrators. Some of us kind of muddle through, I felt lucky I had some natural ability in terms of being able to manage; at one point there were over 50 people on this project. Not support people but people actually working on the project, economists, faculty, graduate students, etc. So it is an enterprise. Being able to coordinate and manage that, it's just like, my analogy is it's like a car, you've got to make sure all four wheels are moving in the right direction at the same speed, otherwise that car's not going anywhere.

STEM faculty recognize that managing an award requires the same team effort that the science project itself demands:

> If you do an analysis of the faculty who really do well, and who do well over time, who don't get burned out by one or two projects, I think what they do is they set up a shop. They set up shop. They realize that they excel in certain realms, maybe as part of the grant writing or planning or anything else, but they also give all their management of their projects to a good postdoc or a good lab manager or a good research technician, so they devolve it. You see them, you can pick them out. I'm sure you are interviewing a whole bunch of them, who are very good, who literally have set up an enterprise. Then managing the grant becomes a bit of a self-fulfilling prophecy.

Other STEM faculty also emphasized their dependency on administrative support:

> Managing the grant is easier, if you have people like our Director of Administrative Services, and our business officer. These are phenomenal people, they are on top of it. I am on top of it because we get stuff like this, these monthly reports, on all of my accounts. This gives me a much more comprehensive prospectus. I have great support staff. Here's some more administrative aspects, here's the monthly VISA bill I get from my technician. This is typical, just for supplies. Like the mouse bill, but not telephone bill, not FedEx charges, not salaries. I have to review this, they have to wait for my approval. They take care of the rest.

As one faculty noted, handling awards is not an experience they anticipated while getting their doctorate:

> You don't get trained in [managing an award] in graduate school, for the most part. And not as a post doc either. You come into this job, and sink or swim. You learned the science part, but all the management part, you have to learn it on the fly.

Key Variable: Knowledge

Knowledge is a factor both in faculty socialization and organizational culture. It's the core information and understanding one needs to function in the social world; in this case, to function in the faculty professional world and the higher education institution world. The specific knowledge sought from the informants was their knowledge regarding indirect costs. For all the informants, discussions regarding indirect costs led quickly to broader concerns about knowledge, or the lack of it, as to how indirect cost recovery works and how the funds derived from indirect cost recovery are used. An associate professor in a bio-medical department described the process of learning about indirect costs:

> So when I first prepared a proposal, I was hired as an assistant professor and I really didn't understand what overhead was. I knew it was some kind of money that went to the institution that came from the funding agency. And I heard a lot of people complain about it. But I think now, now that I've been on search committees, and though I've never been a department administrator I've spent enough time at faculty meetings, I think I understand now what the role of overhead is. It was a gradual process of submitting proposals, looking at what was part of the F&A calculation, talking to people about where our department budget came from, how start up packages get produced, all that, and eventually I

> came to understand that, I guess to summarize, I would say that my understanding of overhead is that it is a kind of sales tax on your grant expenditures, that supports the whole research enterprise.

Even once the STEM faculty achieve a basic understanding of what indirect cost recovery is, they still feel mystified as to how it is used:

> I really don't know what happens to the indirect that comes off the grants. I'd be surprised if anyone knows what happens to it. I suspect it gets swallowed up into operational budgets of every unit that recovers the indirect costs. Whether that was the initial intention or not I don't know. I don't know if that is a common practice at other universities. I've been at other universities and this is not the worst I've seen. Budgets for the most part here are held at the level of the department. So if I get a grant then the salary component is credited to the department, since that is part of the department budget. Then maybe I can negotiate a portion to cover costs for the students or something like that. At Stanford that was not the case, budgets were held at the college level. If I brought academic salary then the college kept the offset, not the department. I don't think the way they use the indirect costs varies a lot.

The STEM faculty care about how the indirect cost recovery is used, because they believe that some portion, at least, should benefit their own department and their own projects:

> Now in this department historically whatever overhead is returned to the department, a third of that is passed back to the faculty. So I think what happens

> is, 16% of that comes to the department, and a third of that goes back to the faculty and gets set up as a priority account. Even our old chair thought maybe he could keep more of it in the department, add it to the start-up packages. Of course the faculty feel passionately about that, about keeping it as it is. What I thought was interesting, I'm currently the chair of the department, so I went to some meeting, a new chair meeting, with the Provost people, and they gave a little speech on best practices. And they actually said that was a best practice, to return a third. It's not uniformly done.

The lack of complete information about indirect cost recovery led to various speculations about the administrative rationale:

> Some of it goes to the College, some of it comes back to me, and some of it goes to the State, I think, that they keep, and the large bulk of it gets spread around the university in a way that is not transparent, I don't know how it's used. They don't want transparency, the moment you are transparent you open up the door for someone to say I don't agree with you spending on that. Why are you doing that? It gives them a tremendous amount of flexible spending. It's fantastic. It's totally opaque. I have no idea what they do with it, I have no idea. And from their point of view, it's none of my business. From my point of view, I generated it. I generated it with the university's support.

Despite their frustration, a number of STEM faculty tried to keep the indirect cost recovery process in perspective:

> So when you ask, how I came to my understanding, I'd have to say my understanding is incomplete. I understand the broad strokes of what it is for. When you get an NIH grant, they give you the direct costs and they give you overhead as a separate thing. The overhead really matters on NSF funding where it directly cuts into what you can spend. Our F&A rate here is lower than most institutions, maybe it's typical of most public schools, but private schools are much higher and med schools are much higher.

Discussing perspectives on indirect costs also led faculty to broader discussions of learning to understand and negotiate the grant seeking and grant management environment in higher education:

> And I remember, at that time, this was before there was Google, I looked up indirect. And what it said was that indirect, Federal indirect, was for organizations to charge things needed for the grant work but couldn't be easily directly charged, like someone doing the payroll. The second thing was, for preparing proposals, you could include that in your indirect. So that to me was the purpose of indirect, the funding was really designed to help the organization with the grant and contract work. What I became aware of was, in every organization where I worked, it was a slush fund for the higher ups, built off of the hard work of the proposal writers and researchers. So basically you had this over-veneer, this overlay, of people at the top who benefitted from our hard work, but we never had a flow down of that money at all, we never saw it. So in my mind indirect became something that was designed from my work, it was a benefit of my work, of which I never received the benefit, and some higher level

fat cats got this money. Every organization, including the university, that's the way I look at it.

Other issues some faculty brought up related to critical information necessary for managing sponsored research, and what happens when information is not available or acted on:

I will tell you another horror story I've heard. In theory we have this business office that is supposed to help us in managing the grants. They are supposed to make sure the monies get spent in a timely manner. So I think if you don't spend 75% of your grant then you are supposed to return that yearly amount to the NIH, give it back. I was told that a couple of faculty were not monitoring their reports; I mean faculty don't always do that. They could have very simply encumbered funding to cover people, like graduate students, but they had not done that. The net result was money was actually returned from the department back to NIH. The statement the business office gave back to the faculty was, aren't you checking your monthly reports?

Some critical information was learned the hard way, as an assistant professor of genetics described:

I think with the NIH grants [indirect cost recovery] is not as much of a big deal. And I say that because they're just giving that money on top of the $250,000 for the R01. So I don't even think about indirect costs for the NIH grants. But NSF is another story. So the first time I got my NSF grant, I was ecstatic because they said they were going to give me $500,000. And I assumed that was just direct

costs. So when they told me it was the total amount, and that basically I would be getting $330,000 over three years, I thought, oh my god, what am I going to do, that's nothing. How am I going to sustain the lab? We managed to do that, I had to let some people go, so that's where I think it really comes into effect. Where it's not just added on, it's backed into the award amount. That's just, I don't know, I should have learned from my prior experience, so when the Program Officer wrote to me and said, oh yes, we're going to give you an award for $500,000, my assumption that was $500,000 in direct costs, but it wasn't, that was the total. It's a very different way of doing things.

Other STEM faculty worried about the impact of different indirect cost rates on the success of their grant proposals:

It becomes for many faculty, it's a question of, we are paying this rate, and what am I getting for that? Some faculty grumble, I brought in this huge grant, I don't see anything. I may be on the liberal side of it. For me the real issue is, once you start getting into these uncapped, higher F&A rates, how does it affect you just getting the grant in the first place?

STEM faculty address the rate calculation on their grant proposals, without really knowing what, if any, impact the rate may have on their success:

As far as I'm aware it's pretty straightforward, to me, for what indirect is about and what it's there to provide. It's a question more for larger grants, at some point that 52% becomes a real challenge. You wonder, am I competitive? I just had a conversation this morning, about the indirect cost going up on the USDA

> grants. When you are looking at planning five years, trying to plan maybe on four years and then getting a no cost extension. So trying to put a budget together, so you don't want to over budget but if you structure your grant right you are kind of running on autopilot that last year, it's a game right? So how do I put this budget together, with the indirect, and make it palatable to the review panel without making it look overblown? Of course different agencies have different policies, but with 52%, well, I know how difficult it is with 28%. So that's when faculty look at it, that's when you wonder is this making me non-competitive?

A number of faculty noted that learning about grants in graduate school might be worthwhile, rather than struggling once you are in a tenure track position:

> Honestly, I didn't know anything about grants as a graduate student, like from the budget side. And now that I look back, oh god, I was so naïve. I just knew I got paid. I was on a training grant for a while, then I had my own fellowship for like the last three years. When I think back about my PI, and now me being a PI, I think, how did he support all those people? I don't know how many R01s he had, I don't know where he got the money from, but I was clueless. So, I don't necessarily think they need to know, *per se*, but I also think in this day and age graduate students should know more about the budget side. They should know we have this much to spend, and the university is taking this much. I think now people should be more cognizant of it, whereas before, when money was flowing, it wasn't as much of an issue.

Another concurred:

> You know, nothing in graduate school ever prepared me for budgets. Nothing. You learn from your peers in the organization. Usually when you come into an organization, a research organization, you are working on someone else's project, someone else is the PI. They write proposals, you then review it, and you get to see the budget. By the way, the first place I worked after graduate school, they wouldn't show you the budgets. They were very afraid about inequities in salaries.

Faculty were aware that there is an allocation of recovered indirect funds, and a percentage of the recovered indirect costs eventually are returned to the department, and then to faculty in what is called a DRIF account (Designated Research Initiative Fund). But they frequently knew little beyond the fact that it exists, as a biochemistry professor noted:

> We have something called DRIF, it's the money I get back from the indirect. That's the only money I know of. So I have a DRIF account. It has a two year delay. That's the only money I have which I can use if my equipment breaks down, so that's what I use it for. It's unrestricted, I can use it to buy equipment, in a pinch, and if I lose a grant I can use it as a bridge fund, to fund my postdocs. I've heard rumors that the upper administration is thinking about taking away our DRIF.

Although they may not know exactly how the DRIF is calculated or allocated, faculty do rely on it:

> I think it might be two or maybe five percent. Because what happens, I think a half or a quarter goes to the VPR, and an equal portion goes to the Dean. Then half the Dean's portion goes to the department, then half the department's comes to me. So it's a half of a half of a half. So the more money you bring, the more DRIF you can accumulate. I'm happy I actually have a DRIF. It's the only money I have. I guess if I needed bridge funding, I could ask for it from the VPR.

And just as with indirect cost recovery overall, STEM faculty speculated about the allocation of the DRIF by the institution:

> I never understood DRIF. I knew it was held two years, but what's up with that? Why is it held? I've never seen any DRIF. Between the Provost, the Dean, and the department, it vanishes. I think the departments are working on a couple of percent margin. They have no budget flexibility. You have these fixed costs that are 90% of your discretionary spending, it's like our pension funds, right? Fighting over budget dust, two to five percent. I can totally understand why department heads put the pressure on everybody to perform, got to get the big grants, because they need the money to run their departments. Bridge funding is where you can probably negotiate with your department chair, or sometimes as part of a match you get help on graduate student support. I kind of wonder about DRIF, but I also realize that a lot of that DRIF is just supporting department researchers and teaching assistantships and the general operation. Basically it's a mystery.

A center director in public health speculated about the use of the DRIF by institutional administrators:

> The DRIF money goes to the state and they rebate half of it to the university. I think I get a sixth, but remember, I get treated like a department. Principal investigators get it, but through the department. But my biggest peeve is the favoritism shown. That there are all these deals, that no one tells you about. Some centers get x percent DRIF, but some others, because they are starting up or something, get full DRIF. Stuff like that. I have had to learn through listening. No one tells you. So it's very unfair, it's not a level playing field. That's very disempowering. Especially when you learn, there is something other people are getting, that you could have gotten if only you had asked for it.

Key Variable: Role Success

Along with knowledge, the other key variable frequently discussed was role success, and in particular the difficulties of achieving success in the highly competitive STEM fields. An assistant professor of genetics described her story:

> I think [my success] primarily, well I don't know what the numbers are going to be, but I can think of a couple things, and this is sad. The first is, people finally giving a damn about how I was doing. And taking an interest in doing some actual mentoring. That's the sad part. The second is, I think, over the years I got better at figuring out what the people wanted to read, so to speak. But that also just came with time. I mean the first grant I put in I was very naïve. And I learned now, I don't always follow this rule, but when it's worked, it's worked

and I've gotten the money. It's that most of the work that I was proposing for the grant, I had done the majority of it already. This is the game, right? I'm sure everyone will say this. But a lot of the work had been done or at least to the point that we could demonstrate feasibility. It was believable, there was no doubt, no question in anyone's mind. For this last grant that got funded, the big one, we had already submitted a paper for re-review; the basis of that grant, the paper was already under re-review. And so I felt better going in for that grant than I have with a lot of others, except when someone who was quote trying to mentor me said no one's going to rank this above a four because it's not interesting. So I was very happy to be able to tell that person that I got the grant. But that person is right in some respects. In the sense that some people could look at that research and say well this isn't really that cutting edge, what value is it going to add? But I think within my community it adds a lot of value. And I think I got very fortunate that the people on the panel also saw that. So the timing, and perseverance, I'm very stubborn, I think you have to have a thick skin and be that way in this field if you're ever going to be successful. And I think the eventual interest in the longevity of my career, so to speak, to the point where I would send emails saying, hey look guys, I'm not going to get tenure, I'm not going to stay here, I have no expectations to stay here unless someone helps me with my specific aims [in the grant proposal].

STEM faculty know that their success is dependent on obtaining the grants that will maintain their research portfolio:

> The goal of seeking funding is to be able to do what I want to do. The fact is that NIH provides you with the largest source of funds, in bio-medical research, which will allow me to be funded for an extended period of time. Because I've gotten funds from the March of Dimes, and other foundations for anemia research, but they are smaller amounts. Typically $100,000 in total costs per year, for two or three years. So my summer salary comes from the NIH funds, I have several postdocs that are funded by NIH. It is a much more comprehensive, flexible source, rather than, for example, the USDA. There you have to say upfront exactly how you are going to use the funds. Which becomes very difficult, especially because recently all postdocs are now going to be switched from a category 25 to a category 15, which means they are treated as a faculty, now this puts a huge burden on our grants, because you are going to take money from say supplies, and put them into benefits, which was not previously foreseen. In an NIH, that can be done, but it gives me less money for my experiments. But with USDA, you can't, the money was already budgeted appropriately, this for supplies, this for salary and you cannot cross over. NIH at least provides you with some flexibility that other granting agencies don't.

STEM faculty are fully aware of how difficult it has become to obtain sponsored research funding, and have any success with a grant proposal:

> Just not giving up, and trying hard. I don't know, these days the funding success rates are dropping, so you just have to keep trying. Persistence, and sometimes, good fortune. NSF is even more serendipitous than NIH, with NSF every grant panel is a different group of people, so there's no long term consistency. It's a

> crapshoot every time you go into an NSF panel. There again, it takes a fair bit of luck, and really good reviews, and picking your reviewers carefully. Lots of things.

The faculty are also aware that in their fields, grant success represents role success; therefore the rationale for obtaining funding is multi-faceted:

> It's partly training, it's partly getting more hands on to do the work, it's partly that in order to be promoted you need to demonstrate that other people value what you are doing. The way that other people value what you are doing is by giving you funding to continue to do it. So there's administrative reasons, there's human resource reasons, and there's scientific reasons [for caring about grant funding success].

The reality of depending on external funding in order to achieve professional goals is brought home quickly to new STEM faculty, as an associate professor of immunology relayed:

> When people talk about success rates when you first set up, it seems pretty far from you. I just got set up, with a pretty generous start up package. I had students, I'm happy. So then in the first year, I applied for a grant, and I got rejected. I was really surprised. It was a psychological shock. You get blown out by the first couple of rejections, you start to wonder about yourself. Am I qualified? You question yourself, the quality of your science, you doubt yourself. But you have to make a decision, you either give up, or you keep going. I thought, no way am I giving up. I'm already on the boat, I'm in the middle of the

sea, and I have to keep going. That was the most stressful time. The money is shrinking, and people need salary. The department chair, the business manager is meeting with me, [I'm wondering] how can I support my research assistant? The department chair was excellent, he met with all the assistant professors. His focus was on making the assistant professors successful. He stuck with me, I said I am applying for all these grants, I'll try my best to get money, it's up to me, because the department was already supporting me a lot. I remember that time. I think a lot of assistant professors experience the same thing.

The money is a means to an end for STEM faculty, but even so, a critical means to the professional goal success end:

At some level passion and conviction is part of it, you know, you believe in something enough to do the work that it takes to develop it into something that's got promise. Everything in science starts off as an idea, and an idea and $2.50 will get you a cup of coffee at Starbucks. You need to take that idea and do something tangible before the funders will look at you. I guess willingness to take a risk and a determination to try are key features of anybody who has success at getting grants, because you get rejected a lot. You have to believe that what you are doing really has potential and keep at it and be persistent. That probably has more to do with your success than being brilliant. There are a few people who are just so facile with the spin and they magnetize great people around them and it just kind of happens. But those are very rare, most of us are just slogging it out, trying to make our ideas into something marketable.

Achieving scientific objectives, and being able to disseminate what was achieved, is the reward of grant success:

> I don't enjoy writing grant proposals. It is good for science at some level, it forces you to really think about what you are doing, but it's not fun. Not in the same way that writing a paper is. I have some colleagues who don't like writing papers, they would prefer to just do the experiments, but I do like writing papers. It's probably my favorite part of the whole job. Because if you are writing a paper it means you actually had some success in the lab, and that to me is very satisfying. Maybe the short answer is the goal for Federal research is to give me what I need to be able to publish papers. And without some kind of external support we can do very little.

The danger is that grant funding can be fickle, and dependence on that funding leaves STEM faculty role success constantly on edge, as a chemistry professor noted:

> Obviously, anybody can lose funding at any time. There's some acknowledgment that you're trying to get funded, you have history. But you can't be static, you can't not get funding and not try. It's not designed so you can retire in place. We have one person right now who doesn't have funding, and if at a certain point they realize they're not going to get funding, and if they're at a late-mid career stage, then they can take on more teaching, or administrative duties, and still be a productive member of the department, and very valuable. But within the tenure track community [not having funding] does change your professional status in the department.

A molecular biologist reiterated the reality of dependency on external funds in order to succeed:

> The United States had it pretty good and maybe there's some belt-tightening we should expect when times are bad, but I think there is a feeling that basic research is really in danger. Because lack of funding after a while is what we call an absorbing boundary. If your lab is unfunded long enough it just dies. It's almost impossible to restart it again. Whereas in other kinds of fields, maybe not being funded means you just put this thing off for a while. But in research, if you lose your lab technician or you lose your postdoc, your lab is dead, it's gone. Getting money, it's very hard to climb back on that horse once you've lost funding. You don't have a way to generate preliminary data anymore, you can't be competitive again. Once you hit that wall; well, I hit that wall for a year. That was scary. I just got tenure in 2009, so I was "I'm too young to be deadwood man, I still have ideas!" Fear was a motivator, it really kicked me in the butt to submit a lot of proposals.

Indicator: Resource Needs

Resource: Economic

Resource needs, resource values and resource allocation are the indicators for the themes, respectively, of organizational culture, faculty socialization, and political bargaining. Resource needs, the indicator of the organizational culture theme/context in the conceptual framework, was the indicator most discussed. Of the four types of resources - economic, temporal, affiliation and reputational - economic resources were the most discussed. As one informant succinctly put it, "We want to survive, so we are

always looking at available money." Another stated, "There are some really cool questions I want to explore, and I can't do those experiments unless we have the money and the people to do them." Another put it bluntly, "I had some colleagues, before I came here, thought it was horrible when I said research is a business. They're like, it's not like that, it's about truth finding. I say, try finding any truth without money." Another faculty expanded further:

> Well, to be able to do my work, which is very molecularly based, I need the reagents and the support personnel to actually accomplish the work. I could not sit in my office and write a book and do my work that way. I need to go to the lab, I need to go to the field, I need to have a fish room and raise fish, and so being able to do a laboratory, field-based and model-system rearing experiment, you need a lot of funding to make all those components work.

The economic resources STEM faculty need in order to conduct their research projects relate entirely to achieving their scientific objectives:

> You have to be driven to do your research, and you can't do research without funding. If you think your area is an important area, and you can articulate the purpose of your research very well, and you can be productive when you get grants, then if you're successful you produce papers and students. Then you develop a track record. It's a combination of opportunism and strategy. You have to adapt to keep your funding.

The bulk of sponsored research funding typically goes to support scientific personnel, including the principal investigator and others:

> Salary is the big thing in the budget of most proposals, not equipment or stuff. It's people. And if I were a medieval historian, I probably wouldn't need a grant to do my research. Maybe I'd like a sabbatical, maybe get like a Rosslier award so you can go hang out in the archives at Strasbourg, but you're not dependent on a team for your productivity as a scholar. You tend to do it [solo], maybe you have some graduate assistants who help you find books or something, but for the most part people write their scholarly books and papers without a lab. In the humanities this is the norm. If you have a salary and summers off, you can do what you need to do. But in lab science, me myself, given that I teach and have other duties, I could do almost nothing on my own. If I were on my own, I would publish a paper maybe once every five years and that wouldn't be sufficient to be considered successful. I wouldn't get tenure, I wouldn't make an impact in my field. So it's totally essential to have the wherewithal to hire people. Most of the work in my lab has been done by doctoral students, so they have had a mixture of direct support from my grants and teaching assistantships. The ability to support those students and give them some relief from teaching – I've had one postdoctoral fellow that was completely supported on external money – those people-years' worth of labor have produced the papers and the preliminary data for the grants that have kept the whole operation going.

Other faculty supported the notion of having a critical cadre of scientists working alongside you on the research, as a distinguished professor of physics noted:

> I also want to be able to support some of my students and maybe a couple of colleagues, research scientists, research faculty, who are also working in the

same area. So a combination of all that, students, research colleagues, travel, publication costs, all that requires grant support.

Several STEM faculty mentioned other economic resource needs, especially additional administrative support. One associate professor of pathology detailed the concern:

> I know when you run out of funding it's always a problem when you have to go to your department chair. Of course policies can change any moment like with the DRIF. There are so many layers of control that you have to deal with as a principal investigator, sometimes it seems better not to think about it. Even so I still think there should be more funds for administration so that we have more time for the research. It's because timely submission of proposals is so time-sensitive, and then you have to invest time in your staff, you need someone to take care of all the other stuff.

A center director in public health talked about the drive to maintain his program, and the willingness to do whatever it takes to keep it going:

> This year I'm doing a Freshman Connection class and I've been teaching an Honors class. Why am I doing that? Because things were really tight here. By the way, my ability to survive is because I have a supportive Dean. Last year, we weren't sure about the funding, so I took on these courses. I said, how can I bring in more money to the Center? So with teaching these classes, the funding goes straight back to my Center, which is a department. Then we applied for the big NIH grant, and I thought it was a long shot, everyone in the world is going to

> want this project, and lo and behold the grant comes in. You can imagine what it's like. So I teach three hours Thursday afternoon and three hours Friday morning, different groups. I'm telling you this in this context, that I'm always looking for ways to bring in money, and this was another way to do it, to maintain support, to maintain staff.

Indicator: Resource Values

Resource: Reputational

Resource needs, resource values and resource allocation are the indicators for the themes in the conceptual framework. The indicator most discussed after resource needs was resource values. This indicator of resource values is related to the faculty socialization theme and content of this study. Of the four types of resources – economic, temporal, affiliation and reputational - reputational resources were the most discussed when invoking resource values, closely followed by affiliation resources and temporal resources. In one discussion it became clear that even the most powerful reputations could be affected by grant funding issues:

> In some sense we are on the fortunate side in this department, due to the role of grants in our department. You see, what do we do with the money? We don't run labs, we don't need the materials, so for us we can supplement our salary. It's not a disaster if I can't get summer salary. In this sense, it's so different from colleagues of mine in the medical school, where you are lost without funding. It has nothing to do with your level as a researcher or your seniority, everyone is feeling it these days. I just had this discussion with a colleague of mine at

> Stanford, they have a system where they provide bridge funds for researchers in the medical school to maintain their labs. But they will do it only once in your career at Stanford, for one year. So they had two cases this year of Nobel laureates that did not get their grants renewed, it turned into a huge campus discussion about what to do.

Because of their dependency on external support, STEM faculty are extremely sensitive to the nuances of how their research portfolio is judged by the funding agencies. As an associate professor of immunology described:

> We want to survive, so we are always looking at available money. That's very critical. Then we have to ask, can we do the job? There's lots of money available for cancer studies, for diabetes studies. But I'm not going to artificially change my direction just to do the job. So based on what I have currently, can I develop a potential direction to address that problem? Because especially for NIH, they look at the momentum. What do you have, what have you done? They may say, they encourage novelty, but actually they're not. They are looking at whether you can do it. So if you propose a good idea, even if it is novel, however if you don't have the history of doing something with that, or collaborating with someone on that, they will say, they use the term feasibility. It's not feasible.

Other faculty echoed that point, one noting, "for example, they say, an R21 [NIH exploratory research grant vehicle] is high risk, high reward. But if you propose and you don't have preliminary data supporting what you say can be achieved, you don't have a chance." Another stated:

> So every year NIH gets 70,000 proposals. If you don't have a Ph.D., if you don't have an independent lab, if you don't have a history for that idea, the technical part, even if you have a creative idea, then you won't get looked at. It's already filtered. They choose a safe bet. If I have $1,000 and I want to invest it, I want to make sure I'm going to get a return. So they look at who's successful. If you are a National Academy member, if you continuously write good papers, then even if you have an idea that seems crazy, they will consider that. Until you have credibility you cannot be creative.

Other STEM faculty pointed out that even as you try to build your reputation in your field, you have to constantly monitor the preferences of the funding agencies:

> I probably wouldn't have gotten funded if I hadn't really chosen to shift, because these agencies they do have things, o.k. it is sponsored research, but they do have specific goals. Actually, what I would say is that in my field, which is chemistry, we often are maybe more narrow in how we think about our expertise. What I've observed, because I interact with a lot of engineers, is they think they're experts, it's almost comical, they think they're experts on everything. Every funding opportunity they'll jump on.

Not only do STEM faculty need to monitor funding agency preferences, but they need to be aware of the distinct procedures and policies of the dominant agencies:

> At NIH people serve on panels for five years, they have a longer time of serving. So the panel has a memory as to what they told you to do before, such that when you go and change it, they can't ask you to do go and do something totally new.

> Whereas with NSF, every time you write a proposal you get a new group of people, and they might say, well that's fine that you fixed this thing, now they want you to fix that thing. So it's more complicated.

Another faculty member noted that reputation and funding success are mutually interdependent:

> They used to say publish or perish, but now you won't get tenure if you're not funded. And I think that's right. When you get those APT [Appointment, Promotion, and Tenure] letters, it's like a letter of recommendation for a job, anybody can write that, it doesn't cost them anything. But the funding that's available in the field is limited, so people are much pickier about what they're willing to fund. I really feel like that's the hard test of the quality of your ideas and your productivity as a scientist.

Indicator: Resource Values

Resource: Affiliation

Resource values, the key indicator for the theme of faculty socialization and content, invoked not only reputational resources, but also affiliation resources. Those affiliations could be institution-based or disciplinary, and involve graduate students or colleagues. An associate chair talked about his latest initiative with his graduate students:

> Recently, after all these years I started with a new practice, a brand new practice. I get graduate students involved in the whole discussion and process of grant

writing. I don't want them to write grants for me, I want them to write grants for them. I want them to participate. One of my graduate students now is graduating, he might end up being a postdoc. I don't want him to be in the situation I was in as an assistant professor. So I exposed him to the process now. I sat with him from the very beginning and discussed here is a project, it is a proposal, it is related to the work you are doing in your research. You want to work on drug resistance and cancer. I gave him a proposal that did not go through, I gave him the reviewers' comments. I said I don't think this proposal is so good, but I want to hear your comments. Let's think about a new proposal, what would be the aims, how do we write a better proposal? Then I sat with him and went to [NSF proposal system] FastLane, I showed him on FastLane what the budget looks like, that it's not just this 15 pages we worked on, there's a summary, there's other parts. So in two or three years when he has to do it himself he knows what it looks like. That is something I started I'd say late last year, last spring. I think that is what would be a good part of mentoring and education for graduate students.

Another faculty talked about outreach and professional development with students:

One of my staff here has set up a whole internship program for the School of Public Health, every semester, for their community internships. The students spend 36 hours a week here working on projects. And they get phenomenal jobs and opportunities from having been here.

In addition to working with students, STEM faculty discussed their connections with their professional peers, in this case in physics:

> I have quite a few grants that involve other people in my research, and a parallel to that is that I also have a lot of collaborations with people around the country and around the world. So networking is important. And certainly the Internet has tremendously revolutionized our ability to do that kind of thing. I write grant proposals with various people around the country and that requires close interaction and discussions and that sort of thing.

Some noted that their success was intertwined with these professional relationships:

> And so it was really the aggregation of that talent and like-mindedness quite frankly that made the grant and that made the proposal possible. Because if you don't put a good team together, or if you don't have a good team that comes together, in whatever way it does, I would never have been able to do any of this work. I don't think any one of us would have been able to, it was the synergy.

Another STEM faculty member linked these connections to the objectives of the science as well as the development of future scientists:

> It's not just based on science, you become the leader of a team, and you have to learn how to communicate with people, and make sure the job is done in the correct way. So communication is critical, and staff support from the department, from the grant proposal team. It's like running a small company. But it's different, because it's 24 hours. If the animals run out of water, or exhibit some

> weird behavior, they will call me, they will send me an email. During the weekend, at night, doesn't matter. So it's non-stop. And running a lab is different from a small company, it's like a name tag, they look at your background. When I submit a proposal to NIH, they look at my training, under my advisor, a great scientist and immunologist, then they look at my publications, and then they judge me. So I tell my people, your success is not just your own success, it's my success as well. We have a history, we are connected, most of the time for life. If you look for a job, you will say you are from my lab, and if my lab has a good reputation, you will benefit from that. In order to have a good reputation, you have to contribute to it, everybody has to.

Sometimes the professional boundaries get shifted, and you have to adjust accordingly:

> I'm a principal investigator on a big Department of Energy grant right now, which was refunded. I was willing to take my expertise and apply it to this area and work with this group. It's a little bit uncomfortable. There are these communities of people doing research, and if you're in an area you get well known in your area. It can be kind of uncomfortable to move to other communities where you are not that well known. You get funding, but whether or not [it connects to your history], I don't know, it's probably good, it's probably part of your breadth.

Many talked about their service to their discipline, especially with the grant review process:

> I'm a standing member of an NIH study section, and I'm given 200 dollars. To review over three rounds, for 600 dollars, about 30 grants. Three weeks before, you're given them, then you come in to the meeting, you're scoring them, then you discuss them. It takes ten weeks of my time. It's a service to my community.

Another STEM faculty made the point that discipline-based communities can be isolating, especially in fields that are interdisciplinary:

> I sit in the chairs meeting, which is another helpful thing, because I'm part of the chairs and director's Council, so I know what's going on. I was amazed, I'm used to it now, that in economics they were only dealing with economists, there are little domains or fiefdoms. I never looked at it that way, because I don't care what you got your Ph.D. in, I care what do you know, what have you published, what kind of research can you do. So we don't look at it at all that way.

Indicator: Resource Values

Resource: Temporal

For the indicator of resource values, temporal resources were discussed nearly as frequently as reputational and affiliation resources. One assistant professor talked about life after receiving a major grant:

> My husband said to me, I thought once you got the grant things were going to get better, and I said, well, things are better but actually my time has shifted to worrying about other things. But it's certainly not overwhelming to the extent that it was. I feel like I lost two and a half years of my life, trying to write grants,

doing it all the time. So it's definitely better than that. I try to remind him, you know, you're seeing your wife in the evening, you used to not see her! You should be thankful I'm present, I'm participating.

Even once grant funding is in hand, the time pressure to keep everything moving never abates:

Then it's the execution, how are we going to do all of this work, and convince someone else to give us even more money five years from now, that I was a worthy investment? That scares me. Being able to do all that.

Another STEM faculty expanded on the notion that grant success does not mean freedom from preparing another funding request:

It is partially a depletion of your time, because you tend to think, oh no, I've got to write another grant proposal, or renew another grant. I'd much rather be writing a paper than doing that. So I'm trying to give you the possible positive aspects, realizing that, when I think about writing a grant proposal I don't necessarily have a positive feeling about that. It's not my number one choice of things to do.

One mathematics professor explicitly described the time devoted to grant preparation as a cost of being a research scientist:

Now, the cost? With the number of proposals I'm writing these days it takes a significant amount of my time, a significant amount. There are many other things

that I do so I don't know how the time adds together to the number of hours in the day. It is an unbelievable effort.

Other faculty, including a biochemistry professor, concurred:

> The costs are not getting enough sleep, not spending enough time doing stuff which I would like to do, which is actually doing experiments, by myself. I haven't done experiments, with my own hands [in a while], maybe I might get into the lab once a year. At which point people from the lab usually run away, oh no, he's in the lab. Because I find myself, I would say that at least 40% of the time, I am either thinking about or writing grants. Like right now, I have a grant deadline, I'm writing, I've been thinking about it for almost a year. I've got all of the specific aims that are potentially going to be in it. Because without funds, I'm going to have to get rid of people. It's my job to, at least one year ahead, have ideas I'm putting together. Really a minimum of one year. When I got my grant renewed two years ago, I was already thinking, where will I be five years, four years from now? If it's a five year grant, you start writing your renewal in your fourth year. So you really always have a grant for less than, minus one.

STEM faculty all made clear that apportioning their time was a never-ending juggling act, as an associate professor of immunology states about his time writing grants as an assistant professor:

> I was involved in the lab even during that time, and was teaching, and publishing, and trying to get tenure. I was doing experiments myself, I'm like a super post doc, continuously. Especially for small labs, you have to do

experiments, you have to deal with the technical problems. Otherwise you cannot get things done.

STEM faculty are constantly readjusting their expectations given the time constraints and the particular institutional structures:

> Another impact of spending so much time on managing your funding is you don't have time or energy for some of the administrative stuff. I don't have time or energy to do the small instrument purchases, and it takes so long and is so slow for the hiring process, and that really impacts grants. When I worked at Yale it was a little faster; you have a very different staffing model there than here. I was at Yale for 8 years; there you have Institutional Animal Care and Use Committee (IACUC) meetings every two weeks. Managing personnel is a big part of managing your awards. Postdoc are very important but very expensive. But they're really critical for generating data. In bioscience you have a very short timeline for developing new technology; you are really dependent on having them on board and up to speed. So like I said you have very different models with different universities; you just have to deal with it.

And STEM faculty noted that fitting in the hunt for grants was difficult but absolutely necessary, and involved strategic planning:

> Often people will just disappear for a month, and work on their proposals. You have to carve out space in your life to do that. I think the biggest cost is when you pour your heart into a proposal and it doesn't get funded, then you've like, that's a lot of hours, weeks, months, of effort. But often the proposal, o.k., yes,

that version was shot down, but if you stick at it, maybe eventually a revision will get funded so you have to stay at it.

As one STEM faculty stated, you use "nights and weekends, the extra 25% of time that you didn't think you had, that is the impact. You have to find it." But that constant time pressure has other, unintended costs:

> I think that's part of the issues that I've identified that are real for faculty. They don't necessarily have the skills, they suddenly get these huge grants, and they think, now what have I got myself into? It takes a personal toll. It absolutely takes a toll. I'm not sure if faculty, in terms of chasing the almighty dollar, realize what they are sacrificing. I think it typically comes out in quality of life and personal relationships, unfortunately. Because we're all ambitious. We all want to do the best job, we all want the glory, but we all also want our normal lives. Doesn't fit a 40 hour week. Hardly fits into a 60 hour week.

A number of faculty connected the time squeeze on research faculty to the bigger picture of life in the sciences, and the future of the profession. As one stated:

> I think it makes higher education unattractive, it has big negative consequences. Because people, if you look at who is going into chemistry departments, in recruiting faculty, people look at it and see all the time pressure. They think, maybe that's not the life they want for themselves. They see everything you have to do, and if they're in their twenties, thinking about having a family, they wonder how can I do all that? And if you do choose it, you live in a state of constant anxiety.

Theme: Political Bargaining

Political bargaining turned out to be the least dominant theme, trailing faculty socialization and organizational culture. Political bargaining emerged as a discussion point one-third as often as the other themes. Even though the focus of the study was on indirect costs, the political bargaining element came up more generally during discussions of the workings of the institution, as well as during discussions of budgetary and decision-making concerns:

> Given the nature of the center, and being treated like a department chair, I can go up to any chair in the room; by the way, I've been in that room more than anyone else. I've sat through and watched 16 years of it. But now, I'm in the process of asking how do I ingratiate myself with the new Dean? He doesn't know me for anything. Most of the other Deans knew our history. In fact during his confirmation, during the interviews, I asked him about centers. And he said, I think we should have a sunset provision for centers. That's what he said. So let me tell you what I did. We got this new NIH grant, brought in the who's who in the substance abuse world, we held it on campus. And I invited the new Dean and he came and welcomed them all. And in his introduction he says, about us, that he'll support us. You have to play that game. I'm aware of it. I've been able to work well with just about every Dean. And we're unique because we report directly to the Dean.

STEM faculty questioned how indirect cost recovery is addressed by the administration:

> It was clear to me that most of the people in that room, the chairs, they were not business people, and they did not understand any of this. I had a little understanding, enough to be dangerous. I always have felt that the indirect coming to the college, well, they should benefit from my work, because they support me. I am very sort of unhappy or frustrated with the fact that groups like the sponsored research office don't get enough resources. We are proud to show how much the external funding has grown, which means that as a percentage of that, the indirect part is growing every year, and I am very upset that the groups that directly impact the grant-getting are not getting the resources. I can't imagine why; well, I know why it's that way, there's a higher level of people, the Provost or President or whatever, taking that money and spending it any way they want. So we've gotten away from what I said was the definition of indirect to now it is money that can be spent throughout the university. So every once in a while, you'll hear, well, this humanities department can't generate research money so we have to spread it around to them. In reality we shouldn't be spreading it around to them, it should be coming back to the units that generate it.

The STEM faculty talked about the waiver process, and when they chose to pursue negotiating over the indirect cost rate:

> The other thing though, which is different here [from another institution] and which is a plus, is this whole idea of doing waivers or reducing the F&A. I'd get a small seed grant and the indirect is really going to hurt us; well the university

has helped us in the past, there are ways they helped us to reduce the rate. I'm told now you can't do it anymore.

A public health faculty member noted:

There are grants that you apply for the direct, and then just apply the F&A, like NIH. Then there are agencies where they say, like Department of Justice, where they say you get $200,000 and that's it. For those, the amount of indirect is really important because it cuts into the amount of the direct. That's where I'm apt to go in and ask for a waiver. And if the entity has a written policy then we have to follow that.

Overall, four out of the 11 informants had requested a waiver of indirect costs on their projects. One described what prompted the request:

I have asked for a waiver, typically on smaller grants. The latest one that I did was actually a small grant, a contract. I never realized there would be indirect associated with a contract, and they didn't have any policy, so I applied for a waiver. I did get a waiver. It was only a $25,000 contract. I've also often had grants where there was a policy not to pay indirect costs. I appreciate that it still takes time and effort and resources to manage these grants even when there is no indirect cost recovery.

Some STEM faculty looked very closely at the impact of indirect cost recovery and the internal decision-making and budget allocation issues as they affect their department:

I'm very sensitive to these things, not just when it comes to indirect costs on grants, but to operating budgets generally. I did a small calculation about our budget here in the math department. Our budget is approximately $10 million. Let's ignore alumni donations, which we're not big on, let's ignore research grants. The real reason the math department exists, in its size and its budget, is not because of research grants, we're not making big bucks. We are not the physics department that is the size it is because of the money it brings in. If it brings in less it will have to shrink. The math department exists because of its undergraduate program. We teach every semester close to 9,000 students on campus, we are number one together with English, actually we are slightly bigger than English, we are one of the biggest programs on campus. Let's try and figure out how much students pay to take our courses. Let's take the tuition component and let's add the state support for in state students. And the state does not support me to sit here and think about research, they want us to teach, that's why we exist. So when you do the math you realize that state plus students pay about $50 million to take math courses a year. Out of which the department gets $10 million. So in the language of indirect costs we are taxed four dollars out of five for whatever; I know the rooms cost money and the transportation and the gardening and the food, but just the ballpark of what is the ratio here is four dollars out of five dollars. In comparison when we teach summer school we have a special agreement where we get 40% of the tuition. If we had such an agreement for the academic year our budget would be $20 million, it would double. That's just a back of the envelope calculation. But if the budget doubled

there are a lot of good things we could do with the money. Not double my salary, not that I would object to that, but like not teaching students in classes in the Armory with 250 students or 150 students. Academically, educationally we could do much better.

Key variable: Decision-making

Decision-making is a key variable for political bargaining. When talking about decision-making, STEM faculty discussed interactions with external parties, i.e., the funding agencies, as often they discussed interactions with institutional administrators:

I did ask [for a waiver] when I submitted conference grants to the Air Force and the Army and NSF. There was no overhead with participant support costs at NSF, but not Air Force or Army. So I requested a waiver on those proposals and it was waived. It was a set of small grants, $10,000 each. Why do I need to be taxed on those? There was another time, may have been on a foundation grant. That may have been a policy. On another I was asked by NSF for a joint program with NIH-NIGMS to organize a conference, and they needed a proposal, for about $100,000. It was a very funny iteration, they kept asking me to change it. At the end of the day, the program manager [at NSF] figured out a justification in his mind why all the costs are participant support so no indirect could be applied, going from 50% to zero.

Another STEM faculty offered this story:

Like anything your success depends on your ability to work with people in power. Even my big break, in terms of my substance abuse research, and going

> back to the Justice department and all that, all that came about because I managed to sit next to the head of National Institute of Justice on a flight back from a conference, to sit by him and tell him all about my research. He took out a legal pad and started taking notes and that's how I ended up getting a huge project and then eventually getting a visiting fellow. So when I said to you, it's who do you talk with, you have to get to the people in power who make the decisions. It's like if someone wants something from our center, they have to talk to me. That's who you have to get access to, the decision-makers.

When STEM faculty concentrated on institutional decision-making, their dominant concern was the lack of transparency as to how decisions regarding indirect cost recovery are made. One associate chair talked about it:

> So here, is it opaque because they don't want it to be made public, or because most administrators don't know? Keeping a layer of vagueness gives you some flexibility if you want to allocate funds a certain way. It is likely there are some units here on campus that have special arrangements in terms of recovery. From an accounting perspective it's a weird system because you do not know what you are going to receive. That goes back to my, where's the $30 million? How can you not know where's the $30 million? That's three times the budget of my unit, how can you not know? Where's the money? There are all sorts of things that are a mystery to me. Like now we had to close a grant, there was a little deficit, we had to cover it, we had to reverse some charges. So we had to move state funds to cover, but there's no overhead. Then trying to reverse grad student payments,

and the tuition; so how do you know at any time what you really have? It's such a weird situation. How do you forecast?

Another STEM faculty concurred:

There is a lot of lack of transparency. Did you know there was a deal that was made, that if post docs get their own fellowships, the Vice President for Research and the Dean's Office will pay part of their benefits? Which I didn't know, and I had two postdocs, that had Kirschstein NRSAs [NIH Fellowships], and I didn't know it so I was paying from my own grant. I just found this out two months ago. They don't tell everybody. It's special deals.

Even when decisions were in their favor, STEM faculty still did not see much clarity in the process:

It's a black box. Just before you came, I was talking to our Director of Administrative Services, did you see this? They just sent a memo, no more F&A waivers from here on. Because with the new Federal grant regulations, it will be considered cost share…I really don't care, because, well, you know that I got a waiver for the STTR grant. Because putting 52% on something that small, it was going to kill it. So the Vice President for Research was nice enough to do that. But now I'm wondering if they will change it retroactively.

In lieu of transparency or clarity about the institutional decision-making processes, STEM faculty were often left to speculate what might happen next:

> I know that they [administrators] have to negotiate with the Federal government for it [indirect cost rate], and I know that in our department we are fortunate that some fraction of it comes back to us. I don't think that happens everywhere on this campus, or at least that's what I've been told. So when we joined the new college – we used to be in the Life Sciences College, then we became the College of Computer, Mathematical and Natural Sciences – there was some threat that the investigator portion of the DRIF was not going to come back to us anymore. That has not happened in the three years since we've been in this college, so I don't know, if that's a change or if it's just waiting to happen or what.

Indicator: Resource Allocation

Resource allocation is the indicator for the theme of political bargaining and contest. The resource most often invoked was economic, along with the related key variables of decision-making, authority, and actors. As one STEM faculty discussed, the allocation of indirect cost recovery is of great concern:

> But it seems like they [administrators] change their tune. Now they're talking about redoing the formula. Some people feel very strongly about it. It didn't bother me then, and even now, I know there are things that cost money. When we want to hire new faculty we have to set them up in new labs, so you have to put money there. If we want to apply to a major research instrumentation grant, and the grant requires matching funds, then somebody has to come up with those matching funds. I guess in my mind, because we are a state institution, I'm

> thinking that the funds from the state are largely going to education. I would think they are primarily intended for the education of the students. And so, these sponsored research funds should be a way to regenerate the research. What does bother me, is over time, I've become more convinced - and the funny thing is I used to think, because the research enterprise is voracious for funding, I used to think it took the money that was allocated for teaching, that we were cannibalizing the teaching - then I discovered that it isn't that way at all, instead I think the university is taking research funding to cover what is fundamentally the cost of educating the students. That is what I think. Although there is one variable, the faculty salary cost. How do you apportion that? If you go out and talk to the average person on the street, and you tell them the faculty member is only teaching one class, even if it has 300 students, they think you aren't doing anything. Right now my impression is that overall for research, the overhead we are generating is going more into educational initiatives rather than research.

STEM faculty understand there are trade-offs when it comes to resource allocation. As one faculty said, "now that I'm an academic administrator [chair], what's really shocking is, people are constantly asking you for resources. It's just amazing, I can't go a day without some request. Many, many good causes. But most administrators end up doing a lot of leveraging of resources." Even so, many STEM faculty indicated a sense of discomfort with the resource allocation process on indirect cost recovery:

> I don't really worry about it a lot, except, I would say that in general people, because we are in an austere fiscal time, I think people aren't too happy right

now about these things. But it's not about the overhead, it's about how it's actually being used.

And one STEM faculty member tried to parse the relative impact of resource allocation, indirect cost recovery, and internal decision-making:

> So it gets back to this overhead. It does cost, overhead, and the reality is, people expect certain things for their overhead. You have people working in their offices, managing their grants. One of the big challenges right now is we are having many more international visitors, so doing those visas, you'd be surprised. The people cranking out those visas, that's kind of like your overhead. Those are all the costs of doing research. There's the safety infrastructure, on campus we have the department of environmental services, and they serve different areas. We have inspections, etc., so those costs have to be captured. Who knows how the state comes up with the distribution of the costs?

Another STEM faculty in the physical sciences expanded on trying to understand the budget allocation process:

> It would be nice to have more transparency about it, but I think it's hard to have a rational discussion about it without having a better understanding of how they really calculate who should pay these faculty salaries. It's complicated because there's a lot of history and inertia and all that. Departments get budgets, and there are specific faculty lines. On the tenure track line, there's no soft money faculty members. So those are all paid in. So that money comes over, and we

say, that doesn't count for the overhead. Maybe the Provost has a different idea about that.

STEM faculty knew some aspects of the resource allocation process but not all:

> I know there is a two year delay with the DRIF, maybe because I haven't been other places, it didn't seem like a problem. I don't know why there is time lag, I assumed it was an accounting issue. And again, I can see why there is a need for the indirect, like I know I have to pay taxes and I kind of know what they're going for. I guess that's sort of the same thing here, they would feel better about what they are going for, but you can get into these arguments about whether or not the uses are valid, it can be hard to define, there are a lot of grey areas. I would say for instance, those entrepreneurship programs, to me those are pure educational programs, so it is hard for me to think about them as research programs.

Even STEM faculty who serve as academic administrators understood just some pieces of the puzzle:

> I do have the formula, I should know it off the top of my head. It goes to the Provost, and the Vice President for Research, and the College, and it gets divvied up. You have to understand certain things, especially when you are asking for matching funds. When you are asking for matching funds, ultimately people want a financially sustainable system, so if you are asking for matching funds you need to know how much your grant is going to get because people don't want to lose money.

Other STEM faculty made clear they had little time to devote to unraveling the budget and resource allocation mysteries, unless they absolutely had to:

> In some ways I don't care until I do. I guess eventually I do care, like when every two years the DRIF funding is allocated, it's not a guaranteed amount, there are some times when there is a financial crisis and they take it away. But usually you get to two to five percent of the indirect costs back to you as the investigator. You can use it to buy instruments, that's really important. You can't run a lab without instruments.

Key variable: Authority

Authority is another key variable for the theme of political bargaining and contest. STEM faculty talked about authority in particular when discussing waivers of indirect costs:

> But when I first came here in 2007, I had just been awarded an NIH grant, an R00 [postdoctoral support award], and the total amount that they give you per year is $250,000. The university wanted to take 50% of that from me. And I wrote to the Assistant Directors in sponsored programs, and said I can't do this. You are taking half of my grant. The goal of this is to be like an R01 [basic research grant], I have like $250,000 a year and I don't have to worry about the indirect costs. So I negotiated a one-time indirect cost rate of eight percent. And I promised I would never do that again. But the guidelines were, it was subject to the indirect cost rate. And the amount you receive, the direct costs, would be based upon obviously what the university would take for indirect costs. So they

wanted to take 50% back in 2007. And I said no, would you consider doing this, this is a career award. When I had the K award [NIH career development award], the training award as a post doc, the indirect cost rate was eight percent. Would you consider doing the same thing? I can't believe they bought it, but they did. Thankfully they did, actually.

Other STEM faculty referenced authority when discussing the institution-wide allocation of indirect cost recovered funds:

I know they publicize how the indirect, the DRIF works, by unit. You can get the information if you are in administrative circles. If you asked, they wouldn't deny you the information, but it's not public. So I know the percentages, where they go to units. I know that the ones we bring in, believe me, we bring a lot, and I would say all of ours goes back to research. And if it goes to the Vice President for Research, he's going to put all his in research stuff also. But it's the Provost who is taking the biggest chunk of it, and who is the chief academic officer, and who is starting all these other programs.

One STEM faculty noted in particular a mandate coming from the President, and how that authoritative directive was received:

I've just said, our faculty spend 80% of their time on research. But the traditional view of it is that your salary is covered for this. One time the President talked to the faculty senate and he said the expectation was that every faculty member should bring in something like $300,000. And people got really mad about that, imagine if you were in a department like English or something, but even over

> here [in a science department] people got mad, because not every area of research can draw that kind of funding. He made some comment like that. He was an engineer. It made people really mad. It made me think, that is really how they think about it.

Key variable: Affiliation

Affiliation is a key variable for faculty socialization and content. Although referenced more often as a resource, it did come up more generally as an element of faculty professional life:

> The second point I was going to make was good mentoring. Because I think having – and I'm not talking about mentoring as in terms of a senior professor taking somebody under their wing - I think it's actually about having someone who you can trust to work with you. It's kind almost as if you are mentoring each other, because you bring different skills and talents, having the mixture of people on a big project. Yes, we started small, had some small grants. Yes, I started working with colleagues here but also with some engineering colleagues at Carnegie Mellon. It was really through that self-mentoring, co-mentoring process that also really helped, particularly from an interdisciplinary perspective. If you are going for interdisciplinary grants, you've got to, don't know quite how to describe it, you've got to let go. It's peer mentoring.

Especially for STEM faculty, where collaboration is often critical, affiliation may be an element in grant success:

> The first factor was putting together, and I'm not sure I had any real control over this, but an aggregation of like-minded partners at different universities. We had five universities in this project, as well as the two commercial companies, but quite frankly this project would never have happened if I didn't have colleagues and dare say friends who could have been principal investigator or project director as well as I can. It was initially this group that came together, we'd been working together for a while, a few years, and we trusted each other.

Those professional connections not only helped in the technical aspects of the science, but could often affect the budget itself, such as when matching or cost share is required:

> We over matched with the external partners. I thought that was interesting because I think that spoke to the commitment we had from the partners that we had involved. Yes, we had some institutional match from faculty salaries, we had some unrecovered indirect because it was a USDA grant so it was 52% minus 28%, but more importantly we had $3 million of the match coming from the commercial partners. It was their time and investment and support that provided the match. It's very interesting because even though it is a pain in the neck from the administrative perspective to track all that match, it's not funny money, it is real dollars, it's time spent.

Some STEM faculty mentioned affiliation in the context of their own institution-based team, such as one who said, "I have a core staff, of 10 to 15 people, and most of them have been with me for 15 or 20 years." Similarly, affiliation could be with

institutional administration, as when one faculty stated, “What I need to know is that if I’m tight and really need money that there is additional funding I can get, that I can apply for. And that isn’t there except for informal discussions with the Dean. It’s all based on your relationship with the Dean or the Vice President for Research.” Another talked about the growth process undergone in working through the management of his grants, including the graduate students’ involved:

> We didn’t do everything right at the beginning, I was focused too much on the science, wasn’t paying attention to what the students were doing. They weren’t handling the animals the proper way, people were complaining. That’s my problem, that’s not their problem. I have to go to IACUC and explain to them and give them a plan as to how I will correct all that. Then I have to go back to the students, I can’t just say, it’s your fault, you deal with it, no, because, it’s kind of a learning curve for me.

Professional affiliation and engagement with graduate students was often mentioned, such as from this associate professor of immunology:

> I have one student, she was a Master’s student with me. She graduated in August and got a job at FDA. Another student, was able to move into a position through a recommendation from someone who had been at our lab. They knew we had the technical knowledge, and team players. I tell them, I will do whatever I can to help you be successful, I have trained you, I have invested in you, and I want you to be able to do a good job.

Another talked about professional affiliation with the upcoming faculty in his discipline*:*

> One of the best things I've done in my career is to set up a USDA regional group. I had a colleague of mine, a peer, friend, mentor, we put this together. More importantly we formed this group around this issue of national importance, in fact, this grant that was just funded is a direct outcome of that. And I'm happy to say it was one of the younger members of the group that also got funded, she got funded at Clemson. Now there are a number of us who are slightly longer in the tooth who are supporting this group, being supportive, and also getting out of their way. We recognize they are the next gen. This mentoring has been a very important part of my whole career. In fact I was mentored through another group, an environment growth chamber control group, when I first came out of graduate school. I saw how they mentored each other. It was a very collegial, non-judgmental kind of group. I think it was the lack of ego that impressed me most. To have these people who I still think of us as gods, to have them be so gracious, I felt very blessed to be a part of that. I think that is the influence that gives you that bedrock of success. It's all about lack of hubris, then you can actually put these groups together.

Key variable: Internal environment

Internal environment is a key variable for the theme of organizational culture and context. Although organizational culture was often invoked, it was less often that the institutional environment was explicitly described:

> It was a very complex project and I have to say I was very happy to get some very good advice from a senior person who had a similar project that started the year before. He said you will not survive unless you have an administrative assistant. So I hired a half time administrative assistant and I was very fortunate in the two individuals who have managed the position. It literally kept me sane for the last three years, four years actually, mainly because of the fiscal accounting… it was a very visible new grant with cost sharing and audit possibility, it helped to have that institutional support that was absolutely critical, especially the first year when we're muddling our way through, with subcontracts and everything.

On occasion, a STEM faculty would describe the specifics of professional expectations in their particular department:

> In our department the split is roughly 75% research, 25% teaching. For some people research is higher, some lower. If you are going to do a decent job in teaching, you've got to put the effort into it. In our teaching loads in chemistry, some might view them as small loads, but if you're a research active person, you're bringing in grants and so on, you probably teaching one class, one lecture each fall and spring, and then you have a bunch of graduate students. But a lecture class in chemistry could mean you're teaching a class of 300 students, with one or perhaps a half time TA. So it's time consuming.

Or a STEM faculty would talk about how to handle grant writing alongside their other duties in their department:

> I would say most people do grant writing on a binge basis. If there's an important grant, like an NSF renewal, then it's full time for a month or two. I don't write as many proposals as some of my colleagues do, and some junior faculty, they may spend a third of their time at it. Especially if they haven't gotten any grants. I actually don't spend that much time at it, I probably shouldn't admit that, once I get the grant. It's mostly about doing the research and writing papers. I'll do the reports in kind of like a binge also. It's a nuisance but it's not that onerous. It depends on the agency. I've been on some big grants, if you're on a big multi-investigator grant and you're the grant director, then what I said isn't true. Then you are spending a lot, a lot of time administrating it. That's a huge amount of time, and it's difficult because the university doesn't have a good infrastructure, any way to coordinate it. It's a main administrative assignment, and it's not like you are getting out of other duties to do it. And the multi-institutional ones are a big pain too. There are principal investigator workshops and all kinds of big time commitments. You have to learn to manage it. I would say then inevitably some things fall out, usually your teaching will fall out, or your own research.

Finally, one STEM faculty has a specific take on higher education institutional environments writ large:

> When I first came here I didn't want the University name on the letterhead. I thought of universities as this cumbersome bunch of eggheads who didn't know how to do entrepreneurial stuff and I just wanted to be left alone.

Key variable: External environment

The external environment is a key variable for the theme of organizational culture and context. In this study, the external environment most often discussed is the world of external sponsored research funding and Federal funding agencies:

> The other thing that helps, why we are not in such bad shape, is that our main funding source is NSF, and their funding rates have gone down but not substantially. In the very good days they funded 30% of the proposals, now I think it is down to 25% or something like that. So from one out of three maybe now it is one out of four, so even if declined this year you might get accepted the next year. I think those hit the worst with these funding issues are the medical schools, more than anyone else. The study sections became brutal, they just kill each other. The program managers tell me when they come to Council [at NIH] they fight with each other trying to push proposals, so it's not just the principal investigators that see this fallout [of budget cutbacks] but it's at every single stage. Universities will have to evolve to figure this out, but medical schools are in the worst position because they don't pay faculty. Unless they send them to the clinic, which is considered to be the punishment for professors that cannot get funding. It's a huge issue.

STEM faculty know that the byzantine internal processes at each of the funding agencies is another hurdle in grant success:

> So you invest an unbelievable amount of time to put this together, maybe we'll get it, maybe we won't get it. Even if it seems translational, they have priorities,

but the proposals get killed in the study sections. There is only one study section at NIH that will address anything with mathematical modeling. If you look at the roster who sits on that study section, the maximum number of mathematicians out of 25 panelists is four. So you don't know if these people can even read your proposal, there's no way to control that. If they can't then it's dead. Once you sit on these study sections, with the way they operate, you understand how random they are.

STEM faculty also mentioned the jockeying between the funding agencies themselves, and how they view your research:

I'm not saying the NIH is biased, it's just skewed a little bit. It's what's directly related to their mission. Then you go to USDA, and they look at us, and they say, well, you got NIH money. You are working on mice. Now you want to try to work on pigs? I talk to people who sit on the review panels at USDA, and they say, you guys already got money from NIH. So why are you trying to compete for the small amount of money from us? You are excluded both ways. That situation is not getting better.

STEM faculty constantly have to determine if the request for external sponsored funding is worth the effort at any given time:

We are not soft money dependent here. We can survive without funding here. Supplemental salary, being able to support students, those are the primary goals or incentives. We see opportunities to conduct changes in the ways we do things with external funding, things we couldn't cover otherwise. Such as the teaching

> seed grants, educational initiatives through the Center for Teaching Excellence, say $5,000. But if I'm going to take my time to write that, I may as well write a million dollar proposal and do something big. But if you are looking at the basic research side, some things like experiments can't begin without funding.

STEM faculty also are frustrated by what they see as the limited perspective of the Federal funding agencies, who have a set of congressionally determined priorities that dictate the funding available:

> So our proposal is regarding shigella, a bacterial infection of the gut, you see it in third world countries. There are over 100 million infected a year and a million die. Let's say in comparison to HIV AIDS worldwide there are 2 million who die. So the medical school is trying to develop a vaccine to help with it. They wanted to bring math into it to address what should be targeted in order to acquire immunity, use some quantitative tools. It's a good project and is even considered part of biodefense since this is a bioterror agent that is considered potentially dangerous. But it still can't get funding. So here is a problem no one is working on mathematically, a million people die from it, but you can't get funding. That's an example. So the science is gone. Lack of funding can kill science.

Some STEM faculty have had to refocus their research portfolios, in order to stay in the realm of funding agency priorities:

> There are certain things they clearly want. I could see how what I was doing could fit in, so I made a conscious choice to do that. I guess if you're a real purist, maybe it would be difficult. I think it would have been highly risky.

These STEM faculty were acutely aware of the differences between the Federal funding agencies:

> Especially half the time, the way the Department of Energy does funding with their grants, it's crazy, and you know you are getting a continuation [of your funding] but they are so slow. There's big gaps. That's going to be a big problem for this university, how to keep things going. Now NIH, NSF, they are good funders. They're like professionals. They know how to do it and it doesn't get messed up. But some of these others, Department of Energy, Department of Education, Department of Commerce; now I don't know about Department of Defense, I don't do a lot of grants with them. So many of these others, they are doing it like a side project.

Key variable: Actors

Actors are a key variable for the theme of political bargaining and contest. Specific actors were mentioned more often with regard to decision-making and resource allocation, particularly the Provost, the Vice President for Research, and the President. However, in terms of acknowledging direct interaction with actors, there were very few specific mentions:

> It's a very competitive place, you've got to know what people are thinking about you, you have to know what they are doing, and you have to stay connected. It

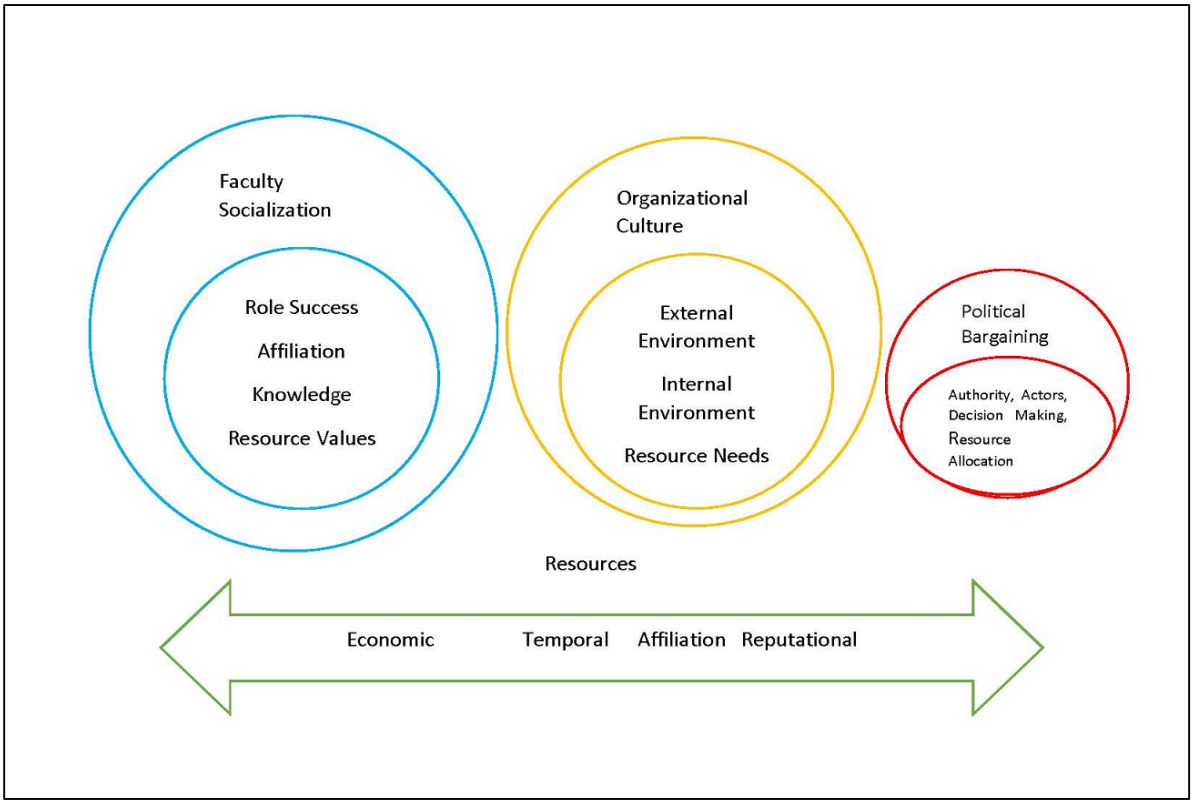
took me, it's late in my career that I learned that I should have been on committees more often. Like I'm on the Institutional Review Board, I'm on the Conflict of Interest Committee, I used to be on the Intellectual Property Committee. You meet leaders of the campus. It's so important.

Summary of Findings

In the previous section, the themes, key variables, indicators and resources invoked were detailed in the order in which they emerged from the primary data: the informant interviews. In addition to absolute ranking, the coding process revealed the relative weight of the organizing themes and their related components. Figure 3 provides a model based on that coding. The theme of faculty socialization, and its related indicator of resource values, along with its key variables of role success, knowledge, and affiliation, was the most prominent theme discussed by the informants. Closely following alongside was the theme of organizational culture, and its related indicator of resource needs, along with its key variables of internal and external environment. The least discussed theme was political bargaining, and its indicator of resource allocation, along with its key variables of decision-making, authority, and actors.

NVIVO coding revealed that the themes of faculty socialization and organizational culture were dominant in the informant discussions. The political bargaining theme was much less frequently discussed, approximately one-third as often as the other two themes. The specific resource noted most frequently was economic, linked to resource needs and resource values. The temporal, affiliation and reputational resources were clustered somewhat more closely and linked to resource values.

Figure 3. Explanatory Model



Conclusion

Informant interviews were my primary data source, and in this section my goal was to allow the informant voice to come through, even as I aligned that voice along the coding matrix provided by the NVIVO analysis. That analysis utilized themes, key variables, and indicators drawn from my conceptual framework. That framework positions organizational culture as context, faculty socialization as content, and political bargaining as contest. In the next chapter, I will interpret these findings.

CHAPTER FIVE: DISCUSSION

This study seeks to understand the perspectives of public research university STEM faculty regarding indirect cost recovery, and to explain faculty behavior towards the application of indirect costs on sponsored research projects. A secondary aim is to begin to understand the phenomenon of faculty involvement in indirect cost under-recovery at public research universities.

The conceptual framework outlined in Chapter Two described the themes of context, content and contest. These themes, derived from anthropological theory and bodies of literature regarding faculty socialization, organizational culture, and political bargaining, provided the basis for the research questions. In this chapter I will array the findings from the data alongside the research questions.

Research Questions: Analysis and Discussion

In this section I discuss the research questions in ascending order, beginning with the secondary questions, then the primary questions, and finally addressing the study's assumptions.

Secondary Question One: Does organizational culture/context help explain the public research university faculty understanding of and behavior toward indirect costs?

Organizational culture is the context in which the phenomenon plays out. Public research university STEM faculty informants describe the urgency of resource needs, specifically economic resources, required to accomplish their research goals. They experience intense pressure from the internal higher education institutional environment

to obtain funding, in order to maintain their laboratories and their research portfolios. They are acutely aware of institutional expectations to bring in sponsored funds, as well as the weight that external funding carries in promotion and tenure decisions. They detail their worries over the decline in grant proposal success rates. They discuss the shift in the external funding environment, which has created even greater competition for a shrinking pool of external funds. They have seen the promotional materials from central administration tallying the institution's increased research funding, and they are generally aware of policies and procedures regarding indirect costs, including the existence of a Designated Research Initiative Fund (DRIF).

STEM faculty focus on the economic resources that support their research agenda. Organizational culture, and the context of addressing internal and external environments, drives STEM faculty to concentrate on *survival* of their research programs as a dominant concern. Their perspective on and response to indirect costs is conditioned by the need to ensure they can maintain their research portfolios.

Secondary Question Two: Does faculty socialization/content help explain the public research university faculty understanding of and behavior toward indirect costs?

Faculty socialization is the content that informs faculty perspectives on the phenomenon. STEM public research university faculty informants describe an array of resource values that drive their research agenda. In particular, they know that their disciplinary reputation and role success are dependent on achievement in their particular field. This achievement involves obtaining research funding, conducting successful research programs, and publishing the results in discipline-based peer-reviewed journals.

In addition, STEM informants discuss the team dependent nature of scientific inquiry, and the importance of collaborators, graduate students, and postdocs in their role success. They emphasize the extraordinary time commitment and time compression involved in juggling their multiple roles and multiple expectations, including teaching courses, applying for grants, conducting research, writing reports, managing labs, and mentoring students. STEM faculty are responsible for the viability of their research portfolios, and as such expect a certain degree of autonomy and a certain amount of respect in determining the course of their research programs. Even so, they know that they are subject to the vagaries of external funding priorities, and dependent on fluctuating internal institutional support. They juggle their time, money, connections and effort with one over-riding goal in mind: to be able to conduct science. These are the resource values – temporal, economic, affiliation and reputational – they invoke to support their research agenda.

Faculty socialization, and its content addressing role success, necessary knowledge, and professional affiliation, drives STEM faculty to concentrate on *discovery* from their research programs as a dominant concern. Their perspective on and response to indirect costs is conditioned by the need to ensure they can obtain viable results from their research portfolios.

Secondary Question Three: Does political bargaining/contest help explain the public research university faculty understanding of and behavior toward indirect costs?

Political bargaining is the contest revealing faculty behavior towards the phenomenon. STEM public research university faculty informants discuss the allocation of economic resources at the institution, and their occasional intersection with the central administration authorities who are involved in that internal allocation. They do request waivers of indirect costs on certain projects and, therefore, seek central administration approval in such cases. However, the involvement of STEM faculty with authoritative decision-making is limited to these infrequent interactions. When it comes to authoritative decision-making, they more often talk about interactions with external authorities, particularly program officers at funding agencies. In lieu of significant bargaining or frequent negotiations with institutional authorities, STEM faculty offer much speculation regarding internal, central administration decisions over the allocation of the indirect cost recovery, and its relationship to the overall institutional budget for research. They find the management of these funds and the related DRIF accounts to be opaque and mystifying.

Political bargaining, and its contest involving authority, actors, and decision-making, drives STEM faculty to rely on *conjecture* regarding their research program funding as a dominant concern. Their perspective on and response to indirect costs is conditioned by their uncertainty as to whether the indirect cost recovery actually benefits their research portfolios.

Secondary Question Four: Do the factors of context, content, and contest intersect and interact so as to explain the public research university faculty response to indirect cost recovery on sponsored research projects?

STEM public research university faculty informants reveal that their perspective on and response to indirect costs is conditioned by the need to ensure they can maintain their research portfolios, by the need to ensure they can obtain viable results from their research portfolios, and by their uncertainty as to whether the indirect cost recovery actually benefits their research portfolios. They concentrate on economic survival, scientific discovery, and budgetary conjecture. Where they believe it is worth their time and effort, they will attempt to minimize indirect costs on their research projects. Even so, they express limited concern about indirect costs as a fact of life, and generally accept the need for some recovery for basic institutional costs. What they show more concern about is the shriveled support for the research enterprise as a whole, both from external sponsors and from internal allocations. They see their own research portfolios under assault, in need of constant trolling for funding and staff and time. They find the institutional budget process murky and unclear, and the institutional research infrastructure shaky and uneven.

Context and *survival*, content and *discovery*, contest and *conjecture*: the elements of organizational culture, faculty socialization, and political bargaining interact and intersect, and illuminate the STEM faculty attitude and behavior toward indirect cost recovery. The informants' attitudes and actions reveal the power of symbolic systems to direct social behavior. Faculty focus on role success and professional affiliations, navigate the organizational culture and its related environments, and allot as little

precious time as possible to administrator demands, all to ensure their research agenda moves forward. The values they absorbed as they became members of their discipline remain front and center in the daily choices they make regarding their studies, their students, their staff and their time. As revealed by the conceptual framework and research questions, the content of faculty socialization determines faculty response to indirect cost recovery.

Having discussed the secondary questions, I now examine the primary research questions vis-à-vis the findings.

Primary Question One: What is the public research university STEM faculty understanding of indirect costs?

STEM faculty informants understand the need to pay for the basic infrastructure necessary to conduct research. What they do not understand is how the indirect costs derived from their sponsored research funds are actually used, nor do they understand how internal institutional budget allocations are made for research. This disconnect held true for all the informants, despite their aggregate success with sponsored research funding and their extensive experience managing grants. None could specifically describe how the indirect cost recovery allocations eventually provided a DRIF account for themselves. Many are suspicious of how the allocation decisions are made, and wonder if research is truly supported or if funds are diverted to other initiatives on campus. While understanding the basic premise of indirect cost recovery, they have little surety as to its utility for their research programs.

The public research university STEM faculty understanding of indirect costs, then, is a limited one. It is an understanding limited by both institutional choices and faculty choices. The institution chooses not to disseminate specifics about internal budget processes or decisions. The faculty choose not to devote any of their limited time to pursuing information about indirect costs or about the university budget.

Primary Question Two: What is the public research university STEM faculty behavior toward indirect costs?

STEM faculty informants describe a range of behavior toward indirect costs. Slightly more than a third of those interviewed state they have requested a waiver of indirect costs on a sponsored research project. Those who did request a waiver said they did it to save direct costs on relatively small projects, and all were successful in obtaining a waiver of or a reduction in indirect costs on those projects. The majority of the STEM public research university faculty informants said they have never requested a waiver. Many faculty spoke about crafting budgets to minimize indirect costs where possible, such as including capital equipment or tuition remission as part of the project direct costs. Overall, however, these faculty did not describe acrimonious encounters with central administrators over indirect costs. Instead, many call indirect costs a tax, and name it as such with the same air of resigned acceptance as one might discuss the Federal income tax: a grudgingly necessary burden.

The public research university STEM faculty behavior toward indirect costs, then, is a nuanced one. As a group they neither abhor nor approve indirect cost recovery. Instead, indirect cost recovery is a reality they work with, and on occasion, work around.

Any such work around is considered with an eye to obtain the greatest amount of funds for their research agenda with the least amount of extra expended time and effort.

Next, I discuss the study assumptions in relationship to the study findings.

Assumption One

The first assumption is that faculty response to and behavior towards indirect cost recovery represents values, beliefs, and choices drawn from the distinct professional socialization and distinct culture of faculty.

Faculty socialization emerged as the most powerful theme in the conceptual framework. The STEM faculty informants speak at length about learning what it means to be a member of their discipline, what it means to be a successful academic, what they have to do to get grant funding. They make clear the values that dominate their choices regarding sponsored research projects, and the related budgets and indirect costs. Those values reflect the distinct culture of faculty, and its emphasis on scientific discovery, role success, professional collegiality and disciplinary recognition. Faculty recognize the necessity of indirect cost recovery, but see only limited benefit from it for their day to day research support needs.

Whereas faculty socialization and the power of symbolic systems to guide social behavior held true, the impact of context emerged as nearly as powerful. Organizational culture shapes faculty social behavior by directing much of their time and effort to maintaining the survival of their research portfolios. Faculty response to indirect cost recovery, then, is driven by faculty socialization but guided by the demands of the organizational culture.

Assumption Two

The second assumption is that when faculty and institutional administrators are in conflict over indirect cost recovery, the resultant formal administrative decision comes about through political bargaining over critical resources.

Political bargaining emerged as by far the weakest theme in the conceptual framework. Clearly, by requesting a waiver of indirect costs on some proposals, a portion of the STEM faculty informants engages in bargaining with central administrators over a critical financial resource. But that process appears formulaic to the faculty who make those requests. They complete a form, submit the request, and are approved. None describe extended negotiations or even questions regarding their requests. Rather than conflict over indirect cost recovery, faculty describe confusion over indirect cost recovery. Even these sophisticated investigators describe the use of indirect costs as impenetrable.

This assumption, then, did not hold true. Informants describe little conflict and virtually no negotiations with institutional administrators. While the public research university STEM faculty might not be enthralled with indirect costs, they devote little time to engaging with institutional administrators over the existence of indirect costs. Instead, the informants describe speculating with their faculty colleagues as to how indirect cost recovery is actually used by central administration.

Validity of Conceptual Framework

The conceptual framework exhibits both strength and weakness in explaining faculty perspectives on and behavior towards indirect cost recovery. The conceptual framework's strength is the emphasis on context and content. Organizational culture and faculty socialization emerge from the informants as the most important components in the phenomenon. Even though 60% of the interview questions asked directly about indirect costs, these questions were pulled into the larger themes and larger concerns of the faculty regarding environmental constraints and professional goals. They see the specific financial issue of indirect cost recovery as tied directly to the complex issues of maintaining their research programs and completing their research agendas.

The conceptual framework's weakness is the emphasis on contest. Political bargaining did not emerge from the informants as an important component of the phenomenon. Instead, the primary social behavior revealed regarding indirect cost recovery is shared speculation. In the absence of concrete details about internal budget processes, STEM faculty guessed among themselves at the decision-making going on at higher levels.

Finally, some structural elements of the model itself were problematic. One variable, Actors, was rarely mentioned. This is presumably due to the weakness of the Political bargaining theme, which presupposes the importance of certain decision-makers. Another variable, Affiliation, was over-represented by being incorporated both as a variable and a resource. It became difficult in the coding analysis to separate the relative importance of this item. I made a decision to concentrate on references in the

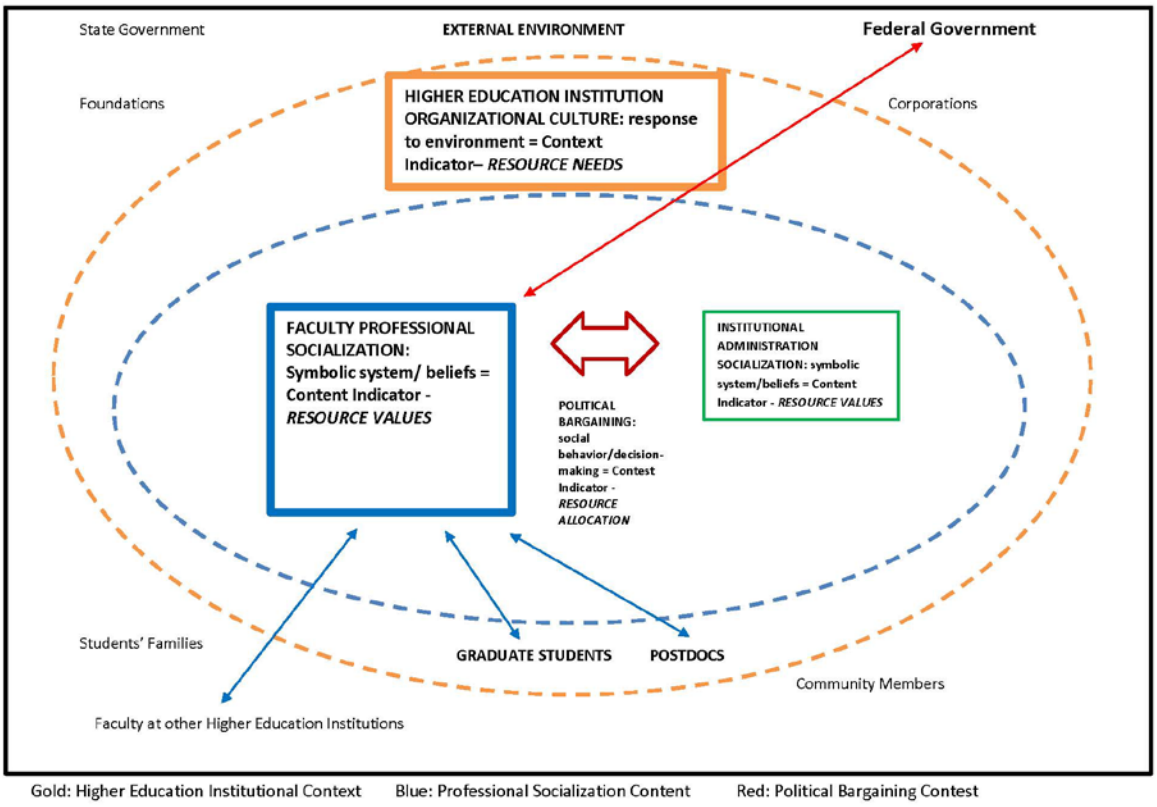
interviews to determine how to code, assigning content related references to a socialization node, and utility related references to a resource node.

Conceptual Model Revisited

The conceptual framework is now revisited here, to reflect the findings. The theme of contest, or political bargaining, is both minimized and expanded. Political bargaining is minimized between faculty and institutional administrators, and expanded to include an external entity, the Federal government. Public research university STEM faculty spoke of negotiating indirect cost recovery with program officers at Federal agencies as often as they discussed indirect cost waivers with institutional administrators.

The theme of content, or professional socialization, is also expanded. Originally the model assumed that students were outside the phenomenon of indirect cost recovery on sponsored research projects. However, faculty made clear the importance of supporting graduate students and postdoctoral associates on their sponsored research projects, both for the survival and success of faculty research agendas and for the mentoring and training of future professionals in the sciences. In addition, socialization is expanded to include faculty at other higher education institutions who frequently serve as collaborators on sponsored research projects. The team nature of science and the interdependency of principal investigators with their graduate students, postdocs, and collaborators figured prominently in public research university STEM faculty discussions regarding sponsored research projects, sponsored research funding, sponsored research management, and sponsored research success.

Figure 4. Conceptual Model Revisited



Finally, the theme of context, or organizational culture, is emphasized to reflect the effect of environmental constraints and resource needs that shape the public research university STEM faculty understanding of and actions toward indirect cost recovery. In particular, shrinking Federal support for research and institutional budget issues loom large in public research university STEM faculty's concerns about maintaining their research portfolios.

Implications for Research and Practice

The findings presented by this study address public research university STEM faculty involvement with a higher education institutional financial policy, and may offer implications both for research in the higher education field, and for practice at higher education institutions.

Implications for research: Future of the STEM professoriate

The most critical future line of inquiry is the need to investigate the impact of the difficult external funding situation on those just entering the STEM faculty. This study's group of experienced and accomplished principal investigators describe a stressful, overwhelming pressure to obtain and maintain funding. They describe a cruelly diminished funding world. What is happening, then, to those just entering the profession, and in particular, those who traditionally are under-represented in the STEM fields? Women and faculty of color are only now slowly joining the STEM public research university faculty ranks. How will they survive in such an arid funding environment, when the competition for funding has become so brutal? Will they get a chance to build their careers? Will the public research university step up the support all research faculty now need, in time to allow new STEM faculty to survive?

Implications for research: Managerialism

Bess and Dee (2014) warn about the growth in the power of higher education administrators, and the concomitant focus on efficiency, effectiveness, and accountability models imported from the corporate world. They call this trend managerialism (p. 23). Importing corporate models into higher education risks putting

too much emphasis on hierarchy, and not enough on collaboration. Administrators frequently employ "strategic ambiguity" when they do need to obtain community support for future plans or mission statements (Bess & Dee, 2014, p. 69). This technique permits higher education leaders to employ broad statements and generic symbols without specifying actual plans. Particularly when attempting to address research infrastructure support, this study makes clear that such ambiguity can backfire. STEM faculty informants are unconvinced that the indirect cost recovery so important to central administrators is of any actual benefit to them. Strategic ambiguity, in this study, leaves research faculty with no reassurance that critical fiscal resources will be used to support their endeavors. Ironically then, just as Tierney predicted, when shared meaning and purpose have not been achieved in the higher education organizational culture, a dissonance emerges in the organization's response to the external environment (2008, p. 99). In this case, the faculty continue to request waivers, and continue to negotiate indirect cost reductions with Federal program officers, given they see no connection between indirect cost under-recovery and their own capacity to achieve their research objectives.

One area for future study is to address non-STEM research faculty perspectives on and behavior toward indirect costs on sponsored research. It is possible one might find greater tension and hostility expressed towards indirect costs on the part of faculty who typically receive much less external funding. Might researchers in the humanities or the arts have more conflict with central administrators over indirect costs? How faculty deal with institutional financial issues beyond sponsored research is another line of inquiry. Is the mystification about the internal budget process an issue beyond just the

research component of the university budget? Also, administrator socialization may be another area to explore; is the managerialism described by Bess and Dee part of the socialization process for higher education administrators, and can it explain their actions towards faculty and indirect cost recovery? Finally, studies of Federal government agency program officers and their attitudes and actions toward indirect cost recovery may provide insight on the sponsor side.

Implications for research: Sub-group model

Another implication from this study is the weakness of the "sub-group" model. Mentioned by both Bess and Dee (2014, p. 30) and Tierney (2008, p. 40), these authors discuss categories of administrators, faculty, and students as "sub-groups." The danger with this terminology is that it implies a type of hierarchy more commonly found in corporate entities. For higher education institutions, how can faculty or students truly be "sub-groups"? They represent the fundamental participants in the university world. Initially, my study accepted the notion that research faculty represented a kind of sub-group, and that their involvement in indirect cost recovery was representative of a limited decision-making process with a sub-group of administrators. It became clear that the issues presented by the faculty informants expand beyond a sub-group determination. These issues involve the very nature of faculty socialization itself, the disciplinary values and goals inculcated in the individual faculty as they move into and conduct their profession (Becher, 1989; Tierney & Bensimon, 1996). These concerns transcend a "sub-group" categorization.

Similar to another non-profit, mission-driven institution, a hospital, I posit that faculty and students are the essential elements of a university just as doctors and patients are the essential elements of a hospital. Interactions between administrators and the expert professionals of an entity (faculty or doctors), or interactions between administrators and the beneficiaries of that professional expertise (students or patients), might want to recognize that this organizational structure is profoundly different from a corporate, profit-driven, industrial production enterprise. Instead of "sub-groups" I prefer "inter-group", a term less frequently employed. To that end, future organizational studies may need to reconsider how to categorize inter-group interactions at such expert professional-dependent entities as hospitals and universities.

Implications for research: Expert professional dependent organizations

Following this concern, this case reveals another issue for organizational studies. The conceptual framework relied heavily on resource dependency theory and the constant search for resources. The conceptual framework also invoked anthropological theory, which assumes the constant search for resources in order to survive, and the constant creation of resources, such as knowledge or connections to others, in order to thrive. Organizational culture studies, particularly when investigating modern, complex, expert professional entities such as higher education institutions, or public hospitals, or school districts or software engineering firms, need to recognize that for these organizations, both the search for resources and the creation of resources are fundamental processes. Anthropological theory, in this case, helps expand the notion of what resources are truly critical for these enterprises. Higher education organization culture studies must attempt to acknowledge the importance of not only the economic

resources, but also the temporal, affiliation and reputational resources that sustain it. This rebalancing may inform our understanding of the consequences of seemingly purely financially-driven decisions, such as relying on adjunct faculty for the majority of instruction, or not providing adequate administrative support to research faculty. Those fiscal decisions may ultimately lead to declining student success, or declining indirect cost recovery, impacting institutional effectiveness and resources in unanticipated ways.

Implications for research: Compensatory legitimacy

Another implication for research is to pursue a concern expressed by Levitt and March: the tendency of leaders to attribute organizational failures to the actions of others (1988, p. 324). Higher education administrators emphasize the need for research faculty to adhere to the institution's indirect cost policy when submitting grant proposals, even as these same administrators are unable to obtain adherence to the institution's negotiated indirect cost rate agreement on the part of Federal government sponsors. Instead, much professional conversation in the research administration world is about faculty non-compliance with indirect costs policy (NCURA, 2014; Sedwick, 2009). This emphasis may also be an example of compensatory legitimacy, an attempt by higher education leaders to appear to be addressing the problem of indirect cost under-recovery by focusing on faculty compliance, rather than focusing on the more difficult task of sponsor compliance.

Implications for research: Knowledge deficiency

A final implication for research is the ironic lack of knowledge suffusing an educational entity. Whether intentional, such as a higher education leader utilizing

"strategic ambiguity," or whether due to time compression and institutional inertia, it is remarkable how little direct information many extremely intelligent and competent faculty informants had about financial issues that directly affect their professional goals. The question is whether this particular institution is typical or not in this regard; is this dearth of information a phenomenon one would find at other research intensive institutions?

Policy problems are "thorny manifestations of value tensions and value dilemmas. As such, they are considerably more complex and consequential than they might otherwise appear." (Malen & Knapp, 1997. p. 434). Indirect cost policy problems operate in a narrow higher education fiscal policy arena, but in this case they do indeed illuminate value tensions and value dilemmas in the higher education research enterprise.

Implications for practice: Offer faculty more transparency and support

This study reveals that when it comes to public research university STEM faculty and indirect costs policy, it is clear these faculty are less concerned about why indirect costs policy exists than they are concerned about how it is used. The potential of discovery, the possibility for increased knowledge and increased understanding in their field is what drives these STEM faculty. Their involvement with indirect costs policy is peripheral to that drive. When the indirect costs policy issue is raised, these faculty are most frequently accepting and yet skeptical.

Given that skepticism, it may be worth higher education administrators' time to ensure that not only are faculty made more fully aware of how indirect cost recovery is

handled, but also that the indirect cost recovery is actually used to support the basic research enterprise. The site institution's website has layers of web pages discussing indirect costs, albeit without the specifics as to how the consequent indirect cost recovery is distributed. Clarity regarding distribution would be step one. However, communication about indirect cost policy alone is not sufficient to obtain faculty understanding. Ensuring faculty obtain direct administrative support, on a daily basis, in managing their sponsored research projects is the more consequential step two.

Faculty skepticism is not unwarranted. The site institution, like many public research universities, is under pressure from state legislatures and state officials to prove the utility of the university in advancing state economic development (Harris, 2012). In particular, technology transfer and entrepreneurial activities are extensively promoted (Case, Coleman & Deshpande, 2013). The site institution's Vice President for Research Office website contains an exhaustive list of initiatives focused on university-industry partnerships, translational ventures, start-up boot camps, commercialization support, technology development, and other innovation and entrepreneurship activities. Faculty may reasonably wonder where the funding to support such activities is coming from, especially given the lack of transparency in the budget process.

The premise holds that institutional budget allocations can reveal underlying institutional values. Therefore, if indeed the indirect cost recovery is used primarily to support basic research, then the actual allocations are worth revealing. Higher education administrators may find public research university STEM faculty will request fewer waivers if they are reassured that the indirect cost recovery supports their research agendas. If, however, much funding is being redirected to other initiatives, to foster

better public relations with external constituencies or to advance administrator profiles, then the faculty suspicions will be confirmed. As one molecular biologist put it, “Cutting off basic research is like eating your seed corn. It’s the future.” If basic research support is being starved, then ironically there will be fewer and fewer discoveries that can foster innovation and lead to technology transfer and potential commercialization.

The site institution trumpets the annual increase in total research funding, while the faculty informants speak of the need for more administrative support, to save their time for conducting research. Increased research funding should lead to increased support for the research faculty. As an immunologist noted, “It’s as if you are trying to raise fish, you have to keep adding water to the pond. If you just try to increase the density of the fish without adding water, that won’t work.”

Basic research needs dull, ordinary, basic support. If higher education administrators truly want to support the serendipitous slog that is science, then they need to do all they can to relieve the extraordinary administrative burden that currently undermines science and scientists. That 42% of principal investigator’s time is spent on administrative activities, rather than on their actual research, is a shocking enough finding (Rockwell, 2009; Schneider, 2014). This redirection of expertise can be fixed. Just as in the teaching arena the focus should be on what creates student success, the focus in the research arena should be on what creates faculty success. Higher education administrators can advance research faculty success by rebalancing the focus on compliance with a focus on support.

Implications for practice: Acknowledge faculty fund-raising burden

Too often, the public research university STEM faculty informants express feeling marooned. They try to manage all the pressures of seeking grants, conducting research, maintaining a lab, writing reports, and working with collaborators and students, all with a sense of isolation. Interactions with central administrators and central administrative support is infrequent. Central administration budget processes are opaque. The day to day operations of the STEM faculty member's research program is front and center for research faculty. Offering more direct, concrete support, more administrative personnel on the ground, may be the best first step in alleviating both faculty time constraints and faculty skepticism.

Administrators, then, would do well to reflect on their own narrative regarding faculty and indirect costs. Rather than assume resistance and defiance on the part of faculty, or just plain ignorance, administrators can learn not only better ways to communicate the utility of indirect cost recovery but also implement better uses for indirect cost recovery. The model currently in place (see Appendix B) is not sustainable. The dwindling pool of tenured and tenure-track faculty cannot be held responsible for every financial and technical aspect of sponsored research projects without additional support. Public research university STEM faculty are responsible for the caliber of the science, and the viability of the scientific results, in their research projects. They need to mentor and train graduate students. Outside those fundamentals, the higher education institution can step forward to address the other obligations that burden STEM faculty time. The higher education institution can provide complete, ongoing administrative

support to these faculty in managing project budgets, in submitting grant proposals, and in completing sponsor requirements.

Beyond simple communication regarding the importance of indirect cost recovery, therefore, central administrators need to demonstrate the utility of indirect cost recovery. Information alone will not obtain faculty understanding or change faculty behavior. Delivering substantive support to public research university STEM faculty is the most significant step in gaining their trust and in advancing understanding.

Administrators at public research universities should also note the fact that typically 25% of institutional revenue comes from sponsored research (COGR, 2014; SHEEO, 2010). Supporting those who bring in these funds, the research faculty, can be as important to central administrators as is obtaining compliance with indirect costs policy. Acknowledging the time constraints and importance of temporal resources for public research university faculty can be another central administration goal. Faculty will not attend face to face training unless their promotion and tenure are dependent on it. Instead, compliance training can be provided asynchronously online, in small, well-constructed, compact modules, making the most of faculty time.

Implications for practice: Research enterprise realities

So what in the end is the faculty role in the under-recovery of indirect costs? As noted early in the study, analysis of fiscal year 2010 institutional financial data indicates that faculty waivers at that time accounted for approximately 18% of the non-standard indirect cost recovery. The result was a loss of more than $6 million in potential indirect cost recovery. But more than 80% of the under-recovery was the result of sponsor

restrictions, not faculty requests. The consequent loss from sponsor restrictions was close to $30 million. Of course, waivers are not the only venue faculty have for reducing indirect costs, as has been previously discussed. The impact of faculty choices regarding indirect cost recovery is real, and worth addressing. Saving the institution $6 million by achieving full recovery is not inconsequential. Obtaining faculty support in achieving greater indirect cost recovery will entail giving faculty the support they are looking for in their research arenas.

Fundamentally, it appears as if higher education administrators have already adapted to the reality of the past 20 years. That is, despite a negotiated rate agreement providing 52% in indirect cost recovery, the actual recovery will typically be half that amount. Rather than point to faculty as the delinquents in the research administration narrative, it may be more productive to be honest about how the research enterprise is actually funded, and about the difficult choices that need to be made on a daily basis in order to maintain it.

In summary, implications for this study include a possible contribution to the understanding of faculty behavior related to external research funding and institutional fiscal constraints. Both the Federal government and higher education organizations are keenly interested in the issue of indirect cost recovery, and the policies regarding it are in a state of flux. In addition to contributing to a better understanding of current practice, this study might also contribute to a better understanding of inter-group interactions in higher education organizational culture. The findings from this study direct institutional administrators to consider less emphasis on compliance and hierarchy when working with expert professionals such as science faculty. Instead a more effective focus might

be on transparency, communication, and clarity in budget processes and organizational decision-making, and a concentration on support to relieve faculty's administrative burden. For higher education researchers, the findings suggest that we need to create more sophisticated models to help us understand organizations dependent on expert professionals.

Limitations

This study focused on the public research university STEM faculty and their involvement with indirect costs on sponsored research projects. As such, any findings from this study do not necessarily address the attitudes or actions of non-research intensive public university faculty, non-STEM faculty, or private university faculty. Nor does this study focus specifically on the attitudes and actions of research university administrators, except where included to highlight the institutional expectations and obligations imposed on public research university faculty.

Additional limitations inherent in this design include the case study approach; investigating more than one site may have provided a stronger argument. The use of purposive sampling for obtaining informants can be seen as too directed and limiting, and thereby can limit the transferability of the findings. Also, inherent in the participant-observer role is the possibility of bias and skewing of themes. These concerns were addressed as fully as possible by methods for obtaining reliability and validity, including triangulation, saturation, member checks and peer review.

Summary

The site institution has moved aggressively to digitize proposal submission and award set up processes, to improve office efficiency and to improve data collection. The electronic system, however, is not designed with departments or faculty in mind. Instead, data entry requirements have increased for departments and faculty, even as hiring freezes and furloughs have constricted departmental administrative support. Towards the end of the study, the following episode occurred. A highly successful principal investigator, with a multi-million dollar research portfolio, received a new award. This principal investigator has a foreign collaborator, and months after the award was received by the site institution, the foreign collaborator contacted the principal investigator. The collaborator said he could not begin experiments as he had not received any funding.

The principal investigator, dependent on timely experimental data, asked the central office why no subaward was issued to his foreign collaborator. He was told that he had not completed a subaward request form.

The electronic system does not include any form of notification to principal investigators flagging the existence of a collaborator on a project. When an award is set up, the faculty member is expected to retrieve the original proposal, typically submitted a year or more earlier, ascertain the possible status of a funded collaborator on the project, access an online subaward request form which is not linked to the electronic system, enter data into the form, save it as a PDF, and submit it to the central office. If

the subaward recipient is a new entity to the institution, then a separate vetting process will occur, adding additional time to the issuance of a subaward.

All of these standard operating procedures are perfectly legitimate business processes. A principal investigator should formally request funding for her or his collaborator, to confirm that the intention to collaborate remains as it was at the earlier proposal stage. New sub-recipients need to be vetted, to determine their ability to properly manage external funding, especially if the source is U.S. Federal government funding. The focus on financial management and institutional compliance, however, need not always trump direct faculty support. Paperless offices and digital systems may advance the institutional bottom line and institutional data gathering, but unless thoughtfully configured, these advancement do not necessarily reduce administrative burden on faculty; instead, they may increase it.

In this case, the faculty member may indeed be at fault for not initiating a subaward request form earlier in the year, soon after the award came in. But the question remains, where is the balance between compliance and support? Is it really a more effective use of highly trained expert professionals to have them key in a form? This administrative expectation is in addition to the lab managing, experiment conducting, report writing, student mentoring, journal-article generating behavior we know is the life blood of the scientist.

The central administrative office, in this case, appears to be treating the principal investigators as a sub-group, whose time and effort are subordinate to office efficiency

and financial compliance. Administrative burden on faculty does not appear to be a factor in this central office strategic planning.

A simple solution to this problem would be to incorporate an automatic notification in the award set up process, to remind the principal investigator of the existence of a collaborator on the original proposal. Another enhancement would be to link the subaward request form to the electronic system, reducing the need to re-key in all the critical information necessary for issuing a subaward. Such an enhancement to the existing system, however, would require some central office funding to add this functionality to the digital processes. Currently, such a resource allocation is not anticipated.

Instead, the values of the public research university STEM faculty emphasizing discovery are deferred to the administrator values of compliance. Given that 42% of principal investigator's time is already used for compliance, rather than research, then this recent episode does not bode well for any potential reduction in administrative burden on faculty at any time in the foreseeable future.

Ironically, while central administrators insist that principal investigators are fully responsible for all aspects of their sponsored research awards, including not only the technical but also the financial components, these same central administrators are reluctant to provide all the resources necessary to enhance the efficiency and effectiveness of principal investigator's time on these projects. Principal investigators are expected to manage complex sponsor requirements and budget processes alongside conducting basic research, presumably finding the time wherever they can.

Overall, my study shows that faculty are more skeptical than combative with regard to indirect cost recovery. That attitude may find confirmation in this vignette. Public research university STEM faculty may legitimately ask why can't there be more direct support for faculty in managing sponsored research projects, direct support that can potentially save their time for research. If such support were forthcoming, these faculty may be less inclined to reduce indirect costs on their sponsored research. In the end, higher education institutions may obtain the critical resource of indirect cost recovery more effectively by providing critical faculty support, rather than by solely emphasizing faculty compliance.

Appendix A

Interview Questions

Demographic survey:

1. What is your gender? Race? Ethnicity?
2. What year did you receive your Ph.D.?
3. Where is your primary appointment? (department/school)
4. Are you currently a principal investigator on a Federally funded sponsored research project? (confirming award data)
5. What is the total award amount on your project(s)?
6. Who is your sponsor(s)?
7. How long have you had this/these award(s)?

Open-ended study questions:

8. You have been very successful in obtaining Federal funding. To what do you attribute that success?
9. What is your goal in seeking Federal funding?
    a. Probe: is that goal primarily financial support?
    b. Probe: are there also professional goals?
10. What is the impact of seeking Federal funding for you?
    a. Probe: does grant writing use up a lot of your time?
    b. Probe: do you involve any professional networks?
11. How did you come to understand indirect costs?
    a. Probe: who explained them to you? Was it clear, did it make sense?

12. How do you deal with indirect costs on your funding proposals?
    a. Probe: is it ever a problem? Does it depend on the project?

Semi-structured study questions:

13. How would you explain indirect costs to a new graduate student?
    a. Probe: does that explanation focus on finances? Administrative pressure? Techniques for reducing the impact?
14. Have you ever sought a waiver of indirect costs on a project?
    a. Probe: What issues get raised? What justification is used?
15. In your understanding, how are indirect costs used?
16. Do you see a difference between how indirect cost policy is promoted and how indirect cost policy is conducted?

Wrap up question:

17. Is there anything else you would like to tell me about your views on or experience with sponsored research and indirect costs?

Email invitation to potential Informants:

Dear Dr. XX:

You are invited to participate as an informant to my doctoral research study, which investigates faculty attitudes and responses to sponsored research indirect costs. As a principal investigator highly successful in obtaining Federal sponsored research funding, I believe you have the expertise and experience necessary to help me understand the faculty perspective.

Sample questions may include: "What is your goal in seeking Federal funding?" and "How do you deal with indirect costs on your funding proposals?" Interviews will be scheduled for approximately 45-60 minutes at a time and location of your choosing. If you agree, the interview will be audio taped.

Participation in this study is entirely voluntary. The identity of all participants will be kept in strict confidence. Informants will be de-identified and numerically coded in the data record. The attached informed consent form will provide you with additional information about confidentiality safeguards.

I will contact you by (insert date) to ask about your willingness to participate. If you need additional information about the study, please feel free to contact me at 301-405-5736 or sgossman@umd.edu.

Sincerely,

Sue Gossman

Consent Form

Project Title	**Avoiding the tithe: Public research university faculty perspectives on sponsored research indirect costs**
Purpose of the Study	This research is being conducted by Susan Gossman of the University of Maryland, College Park, under the supervision of Dissertation Committee Chair Dr. Noah Drezner. We are inviting you to participate in this research because you are a highly successful principal investigator with knowledge regarding sponsored projects and indirect costs. The purpose of this research study is to understand research university faculty attitudes and responses to indirect costs on sponsored research projects.
Procedures	The procedures involve participation in an individual, semi-structured interview that will last from 45 to 60 minutes. Permission to record the interview will be requested. Questions include: "What is your goal in seeking Federal funding?" and "How do you deal with indirect costs on your funding proposals?"
Potential Risks and Discomforts	There are no known risks from participating in this research.
Potential Benefits	There are no direct benefits from participating in this research. However, the results of the study may help university administrators better understand faculty perspectives on sponsored research indirect costs and related institutional policies.
Confidentiality	Any potential loss of confidentiality will be minimized by de-identifying individual participant records, using a numerical code rather than names or discipline. All records will be housed on one computer and encrypted; no one will have access other than the investigator. Records linking numeric identifiers to individual participants will be password- protected. The investigator plans on transcribing the interviews; if, however, a transcription service is used the same password-protected numeric identification scheme will be maintained. The data will be stored for five years and then destroyed. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law.
Right to Withdraw and Questions	Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. If you are an employee or student, your

<table>
<tr><td></td><td colspan="2">employment status or academic standing at UMD will not be affected by your participation or non-participation in this study.

If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:

Susan Gossman
sgossman@umd.edu
301-405-5736</td></tr>
<tr><td>Participant Rights</td><td colspan="2">If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:

University of Maryland College Park
Institutional Review Board Office
1204 Marie Mount Hall
College Park, Maryland, 20742
E-mail: irb@umd.edu
Telephone: 301-405-0678

This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.</td></tr>
<tr><td>Statement of Consent</td><td colspan="2">Your signature indicates that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study. You will receive a copy of this signed consent form.

If you agree to participate, please sign your name below.</td></tr>
<tr><td rowspan="3">Signature and Date</td><td>NAME OF PARTICIPANT
[Please Print]</td><td></td></tr>
<tr><td>SIGNATURE OF PARTICIPANT</td><td></td></tr>
<tr><td>DATE</td><td></td></tr>
</table>

Appendix B

Imported from Site Institution's Public Website

Roles and Responsibilities

Submitting proposals, executing awards, conducting research, and administrating sponsored projects involves many different people and units throughout the campus. While there may be some minor variations in processes from Department to Department and College to College, the matrix below outlines the general process and identifies the appropriate party that has primary responsibility for different activities throughout the life cycle of a sponsored award.

Identification of Funding Opportunities

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Search for Opportunities	X					
Provide guidance on funding opportunities		X	X			

Proposal Preparation

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Write technical narrative	X					
Identify subcontractors and request budget and workscope materials	X	X				
Develop budget	X	X				
Identify need for cost sharing funds and obtain documentation for cost share support	X	X	X			
Evaluate requests for F&A waivers or reductions		X	X	X		VPR
Coordinate space arrangements		X	X			
Provide guidance on proposal preparation		X	X	X		
Complete and ensure accuracy of the Proposal Routing Form	X	X	X			

Regulatory Requirements

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Complete compliance forms: Institutional Review Board, Animal Care and Use, Institutional BioSafety, Dept. of Health and Safety, Financial Conflict of Interest Disclosures, Conflict of Interest forms etc.	X					
Reviews and endorses compliance forms as needed		X	X			
Institutional oversight and facilitation of compliance issues						VPR
Ensure that protocols and approvals for regulatory compliance requirements are kept current throughout the life of the project as required	X	X				

Proposal Review and Approval

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Confirm that proposal meets sponsor requirements (text, margins, font, page limits, etc)	X	X				
Review proposal before sending proposal to OSP	X	X	X			
Verify that cost sharing in proposal is listed and that all commitments have been secured	X	X	X			
Review proposed cost sharing for appropriateness	X	X	X			
Programmatic review of proposal and sign Proposal Routing Form or electronically process Coeus Routing	X	X	X			
Provide institutional review and approval of proposal				X		

Proposal Submission

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Electronic Submission				X – unless deviation is agreed to by OSP		
Paper Submission	X – pick up after OSP signoff	X – pick up after OSP signoff				

Pre-Award

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Request pre-award or advance account	X	X				
Establish pre-award or advance account				X	X	
Monitor pre-award or advance account	X	X	X			

Award Acceptance

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Accept sponsor notification of grant or contract award				X		
Review and negotiate terms and conditions for Grants, Contracts, Cooperative Agreements, incoming MTA's, Equipment Loan Agreements, and other types of funding				X		
Provide feedback on nonstandard terms and conditions when applicable	X	X		X	X	OTC
Accept award terms and conditions & execute award on behalf of University				X		

Award Set-up

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Confirm that protocols and approvals for regulatory compliance requirements are current at the time of initial account set-up	X	X		X		
Review award budget	X	X		X		
Establish account number in COEUS and KFS				X	X	

Conducting the Project Financial

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Prepare financial transactions		X				
Initiate re-budgeting requests	X	X				
Obtain sponsor approval of re-budgeting requests, where required		X		X		
Initiate no cost extensions	X	X				
Submit no cost extension notifications or requests to sponsor as required	X	X		X		
Ensure that cost sharing is documented	X	X			X	
Initiate purchases via PCard or with Procurement as appropriate	X	X				
Review and approve financial transactions	X	X			X	
Use financial reports to monitor and oversee expenditures	X	X	X		X	
Review and reconcile accounts on a monthly basis	X	X				
Coordinate resolution of issues on oversight reports					X	
Audit expenditures					X	

Program Income

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Identify program income	X	X		X		
Invoice program income		X				
Receive and deposit program income		X			X	
Identify use and reportability of program income		X			X	
Monitor program income levels	X	X			X	

Invoicing Financial Reporting

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Prepare and submit the invoice or financial report		X (occasionally in conjunction w/ CGA)			X	

Accounts Receivable Management

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Receive and deposit payments from sponsors					X	
Produce and record a letter of credit draw request (Federal awards)					X	
Monitor and pursue the collections of overdue payments from sponsors					X	

Prior Approvals

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Initiate prior approvals for changes to project	X	X				
Approve or forward to sponsor prior approvals for changes to project				X		

Ensure regulatory compliance offices are notified of changes to project	X	X				

Subcontracts and Subawards

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Submit Subaward and Subaward Modification Requests to OSP	X	X				
Oversee programmatic aspects of subaward	X					
Prepare, negotiate, and execute subawards				X		
Review and approve subaward invoices	X					
Subrecipient monitoring	X	X		X	X	

Subcontracting Plan

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Determine if a Small Business Subcontracting Plan is Needed	X	X		X		
Prepare Small Business Subcontracting Plan		X				Procurement
Provide Small Business Subcontracting Plan to Sponsor				X		
Prepare and Submit Small Business Subcontracting Plan Reports		Input provided by Dept.				Procurement

Technical Data and Reports

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Ensure integrity of all research data	X	X				
Prepare and submit technical reports to sponsor	X			X (Only when Required by Sponsor)		
Maintain the official copy of the technical report	X	X				

Personnel and Effort Certification

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Initiate hiring and appointment process	X	X				
Identify and initiate any screenings required (e-Verify, foreign visitor screening)	X	X				
Complete necessary adjustments to award charges or and/or payroll distribution		X				
Obtain necessary supervisory reviews and approvals		X				
Ensure accuracy of completed effort certification	X	X				
Resolve problems or follow up on certifications not submitted		X	X			Cost-Accounting

Project End and Close-out

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Identify early close-out situations	X	X		X	X	
Ensure all appropriate expenditures have been posted to accounts		X				
Prepare final financial invoice/report					X	
Resolve issues related to unreconciled accounts		X			X	
Ensure that all financial reports have been submitted to sponsor				X	X	
Monitor submission of Final Technical Reports to sponsor	X			X		
Monitor submission of Final Invention reports to sponsor				X		OTC
Monitor submission of Patent reports to sponsor				X		OTC
Inactivate award account(s) in financial accounting system					X	

Maintain official project closeout documents for sponsored projects		X		X	X	OTC

Audits

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Coordinate the A-133 audit for the University					X	
Provide support and/or source documentation as requested by auditors	X	X	X	X	X	Cost-Accounting, OTC, Procurement, and VPR

Ongoing Training

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Provide training to the research community regarding changes to policies and regulations		X	X	X	X	OTC and VPR

Intellectual Property (IP)

Roles and Responsibilities	PI	Dept	College	OSP	CGA	Other
Request a waiver from the University's IP Policy for a specific sponsored project	X	X	X			
Review/recommend action on waiver of IP Policy on a specific sponsored project				X		OTC and VPR
Review, Negotiate, and Execute Outgoing MTA's						OTC
Evaluate commercial viability of University IP						OTC
Disclose IP to OTC, complete Invention Disclosure Forms	X	X				
Market, negotiate and enter into license agreements for University IP						OTC
Report Federally funded inventions to government (Bayh-Dole)						OTC

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