The Journal of the
National Council of University Research Administrators

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RESEARCH MANAGEMENT REVIEW

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Editor's Preface

In this issue of the Research Management Review, we are fortunate to have four articles that address a broad range of issues.

George Dummer's retrospective piece offers the reader a brief look back at the changes George witnessed during his long and distinguished career. As a leader in the field of research administration, George has played a crucial role in policy review, analysis, and formulation. It would be virtually impossible to overstate the contributions he has made to this field. His article, which was presented to the Research Administrator's Discussion Group in Boston (June 1995), takes us back to 1958 and describes how a representative group of key issues and problems developed and evolved over time.

Following George Dummer's retrospective is Steven Smartt's article "Looking Back, Looking Ahead" in which Steve projects what we should expect in the future when we apply the historical lessons to the current scene. Steve adapted this article from his address to the NCURA Region IV 25th Annual Meeting (April 1995). Steve approaches the issues in a neat and incisive manner. His article raises public policy questions that will be the focus of our attention in the coming years.

Thomas Monahan and Jim Fortune offer a statistical perspective in trying to predict success in acquisition of sponsored projects. Their analysis takes into account institutional resources, both financial and non-financial, as well as institutional practices and services. Their goal is to predict which factors on our campuses may contribute to greater success in increasing our sponsored project activity. The authors' methodological approach and analysis are both of very high quality. Their presentation offers readers a set of findings from which we can each derive applications for our institutions. It should also be noted that Monahan and Fortune provide us with the core of their data and findings. They have done more work on this subject and invite readers to contact them if they wish to investigate this matter more fully.

The final article by Richard Streeter addresses the questions of how we can broker partnerships in the relatively new world of "defense conversion." He raises the basic "why" and "how" questions of performing research with industry, with specific references to certain environmental and political changes and opportunities that have arisen in the past few years. Streeter creates a partnership model that considers both the positive aspects of brokered partnerships and the cautionary notes that must be considered in developing them.

Stephen Erickson
Editor
January 1996

Research Administration: Lessons Learned

George H. Dummer

Editor's note: This paper *is* adapted from a presentation to the Research Administrators' Discussion Group, NCURA Region I, *on* June 14, 1995, *in* Cambridge, Massachusetts.

Abstract. Over the past few years, relations between the federal government and the university research community have been strongly influenced by issues of fiscal accountability, centered primarily on OMB Circular A-21, by Congressional hearings conducted by Rep. John Dingell, and by the release of critical federal audit reports. This paper looks at how accountability issues have affected federal-university relationships since Circular A-21 was issued in 1958 and what lessons university research administrators have learned.

INTRODUCTION

Well, here we are in June of 1995-looking apprehensively ahead to fiscal 1996 and waiting for the next shoe to drop. Congress has declared war on the federal deficit and vowed to balance the budget by the year 2002. To achieve this, it has been estimated that reductions of up to 30% may be required in so-called "cuttable" expenditures, including research and education.

One shoe has already dropped. Triggered by events at Stanford University, exacerbated by the Dingell hearings and a flood of critical audit reports, our institutions are dealing with a whole spate of revisions to OMB Circular A-21 which could occupy us for years to come.

An article in the *San lose Mercury* News has assessed the damage as follows:

George Dummer *is* Director Emeritus, *Office* of Sponsored Programs, Massachusetts *Institute of* Technology, Cambridge, Massachusetts 02139.

> "Five years from now, the public may only remember the Stanford University yacht. But the nation's top schools will feel the effect of the indirect cost controversy.
>
> "From Palo Alto to Cambridge and all ivory towers in between, the controversy over questionable research expenses mutated into a colossal public relations disaster that soured the relationship between research institutions and the government . . . .
>
> "It wasn't so much who was right or wrong, vindicated or vilified. It was more the sense that the insular world of academic research was shattered by the insolent world of public scrutiny-and that it may never be the same again."

But has the world of academic research been that insulated? Is this really the first time it has been shattered by public scrutiny? To answer that, let's go back and take a look at where we've been and what we've learned. We'll start in 1958.

1958-1968-THE GOLDEN YEARS

The year 1958 began a decade of extraordinary growth in federal support of research and development-a period in which the partnership between the federal government and the universities flourished.

The impetus, of course, was Sputnik, which was launched in Earth orbit by the USSR in 1957, thus beginning the space age. Twelve years later, in July of 1969, the United States launched Apollo 11 and landed a man on the moon.

To many, these were the golden years for American science. But how golden were they for those involved in the administration of research?

Let me answer that by citing three events:

BOB Circular A-2 1

First, Bureau of the Budget Circular A-21 was issued on September 10, 1958.

Although its structure and complexity were not well received by some universities, it at least seemed to provide more equitable reimbursement of indirect costs than the so-called Blue Book which preceded it.

We were not, however, destined to find out. Beginning with NIH in 1958, Congress imposed statutory indirect cost limitations on most

federal research grants, ranging from 15% and 25% depending on the agency and year. Congress finally responded to university complaints that this was arbitrary and inequitable and removed the statutory limitations in 1966, promptly replacing them with statutory cost sharing.

To give you an idea of the level of understanding which some Congressional staffers had on indirect costs, let me quote one of them:

> "I have absolutely no idea what the universities are complaining about. With a 25% indirect cost rate they only need three grants to cover 75% of their costs, with the next grant they break even, and from there on its pure gravy."

The Fountain Committee

Now we come to the second event. I know that all of you have heard of the Dingell Committee, but how many recall the Fountain Committee?

This was a subcommittee of the House Committee on Government Operations, chaired by Rep. L. H. Fountain (D.NC). It began hearings in 1959 on the operations of NIH and soon thereafter initiated a series of critical reports.

Two events, in particular, caught Fountain's attention in the mid-sixties. One was the way NIH had handled its Health Science Advancement Awards, and the other was the manner in which NIH had awarded a $23 million block grant to the Sloan-Kettering Institute for Cancer Research, thereby replacing 44 separate grants and contracts. In October 1967, the committee issued a scathing report that attacked NIH's administration of these and other grant programs.

As characterized in Science magazine, Fountain's attack on NIH used language that was "notable for its bitterness and hostility . . . The effect of Fountain's latest attack is simply to remind NIH that its operations are under a scrutiny that is continuous, skeptical and perhaps without parallel in relations between a congressional committee and a federal research agency."

Other Congressional Oversight

Quite apart from the Fountain Committee, the Congress was growing increasingly skeptical toward science. Its concern over the escalating cost of research was reinforced by the perception that the geographic and institutional concentration on federal funds favored relatively few constituencies. Its frustration in trying to understand scientific matters was compounded by the conflicting advice it received from the scientific community itself.

The mood of Congress was reflected in the fact that during the period 1963 through 1965 at least five Congressional committees conducted oversight hearings with respect to federal support for research and development.

In the House there were four, and in the Senate there was a subcommittee chaired by Sen. Hubert Humphrey of Minnesota, who was concerned that:

> "The federal government is making a vast intellectual wasteland out of America by having R and D contracts concentrated as they are in limited geographic areas."

Does anyone care to guess what a "limited geographic area" might be? That's right-Massachusetts and California.

To help remedy the situation, Prof. Grant Swinger, Dan Greenberg's fictional academic entrepreneur, proposed that the government build a linear accelerator between Palo Alto, California, and Cambridge, Massachusetts, thereby giving 11 states a piece of the action.

Prof. Grant Swinger notwithstanding, we have learned over the years that the Congress views the geographic and institutional distribution of federal research funds as a very serious matter.

Cost Reduction *Program for* Defense Contractors

Before we leave this decade behind, I want to mention one of my favorite programs.

In late 1963 President Johnson and Secretary of Defense McNamara asked defense contractors-which included some funded by the AEC and NASA-to establish affirmative programs to achieve cost reduction. The few universities covered by this program struggled with some difficulty to accommodate the guidelines issued by the different agencies.

As it turned out, the DOD program appeared to be the most successful-particularly compared with the AEC's-in part because DOD permitted cost avoidance to be counted as cost reduction.

I understand that Secretary McNamara also set an example by implementing the program in his home. The story goes that one day his son burst into the house and said, "Dad, dad! I just ran home from school behind a bus and saved 50 cents!" And his father replied, "Son, that's great! I'm really proud of you! Now tomorrow, you run home behind a taxi and save $6.50."

That, incidentally, is another lesson we learned: federal programs sometimes favor perception over reality.

End of the *Golden Years*

So why did the golden decade of federal research support end? Primarily because the escalating cost of the Vietnam war came into severe conflict with Lyndon Johnson's ambitious programs for "The Great Society."

As a result, the rapid growth in funding for academic research came to an abrupt end in 1968. Was the apprehension felt by the research community any less than what we feel now? Perhaps we can find a clue in the headlines:

Science Magazine: "Money for Research: Prospects for Next Year Are Gloomy"

Chemical and Engineering News: "Outlook grim for federal R&D spending-Science and R&D are no longer darlings of Congress as economy wave sweeps through the Capitol"

Business Week: "Johnson pulls R&D down to earth-The President has stalled the upward path of R&D spending, shifting emphasis from space to more earthbound problems such as pollution. One result: More college researchers will join industry."

On June 28, 1968, Lyndon Johnson signed into law the "Revenue and Expenditure Control Act of 1968," generally referred to as the tax surcharge act. It not only mandated a $10 billion reduction in FY69 appropriations, but also a $6 billion reduction in projected FY69 expenditures. The latter had an immediate and disruptive impact on college and university research projects by placing a ceiling on the aggregate cash payments which sponsoring agencies could make on all research grants and contracts underway in FY69 regardless of when the awards had been made.

1968-1978-THE RELATIONSHIP DETERIORATES

As we entered the next decade, from 1968 to 1978, the focus of federal support for universities shifted from defense and space to domestic and social concerns. Money and organization had put men on the moon. Now they could be devoted to solving the problems of poverty and disease as well as the deterioration in the environment and the quality of urban life.

The Mansfield Amendment

At the same time, however, young people were vocal in their opposition to the Vietnam war and the nation's colleges and universities

provided a platform for their protests. It was hardly surprising, therefore, that federal support for those institutions was curtailed by the Nixon administration.

Funding was further impacted when Congress, in October of 1970, adopted the Mansfield Amendment, which prohibited DOD from sup porting college and university research which did not have "a potential relationship to a military function or operation." The result of this legislation was to significantly reduce DOD support of basic research.

The research environment deteriorated further as two issues related to OMB Circular A-21 came to the surface.

The Battle of the Cost Transfers

In the summer of 1975, DHEW issued guidelines which drastically limited the circumstances under which costs could be transferred between research grants. As interpreted by HEW auditors, they effectively precluded such transfers if the result was to reduce an overrun. In addition, HEW adopted what were viewed as punitive cost recoveries by taking small samples of cost deficiencies and extrapolating them across an entire institution.

NIH grantees protested that the bulk of the transfers in question involved closely related research projects, in many cases complementary projects within a single principal investigator's research program. In other cases, they involved accounts that were not resolved on a timely basis because of delays in recording charges in the institution's accounting system.

For many institutions the issue dragged on for years before being resolved. MIT, for example, was unable to reach agreement with the NIH audit resolution staff, filed a formal appeal with the NIH Board of Grant Appeals, and finally settled with DHEW in September of 1981-six years from start to finish.

Time and Effort Reports

By the late 1970s, federal auditors became harshly critical of the salary distribution systems of many universities and numerous institutions were compelled to negotiate refunds to the government.

In 1975, DHEW proposed revisions to Circular A-21 which included a requirement that 100% of an employee's work load must be accounted for if any part of the employee's salary was charged directly or indirectly to a sponsored agreement.

The controversy which this generated led to lengthy negotiations but finally appeared to be resolved by revisions to Circular A-21 in

March 1979. The issue heated up again, however, in the new academic year as faculty members became aware of the revised effort reporting requirements. Kept alive by an energetic math professor from Yale University, the controversy was finally resolved by revisions to A-21 issued in August 1982.

Fountain Committee

These controversies over cost transfers and effort reporting were the primary causes of the serious adversarial relationship that developed between the government and research institutions over the fiscal administration of federal programs. The relationship deteriorated even further, however, when Congressman Fountain reappeared on the scene in 1977 after two new incidents caught his attention.

One occurred in the fall of 1977 at an institution in the Boston area. It involved an assistant professor of nutrition who alleged that he had been made to sign blank forms vouching for how his NIH grant moneys had been spent, after which the department filled them in with unrelated items and forwarded them to the government.

As a result of this incident and a number of audit reports alleging similar abuses at other universities, Rep. Fountain held three days of hearings in July of 1979 on the "Accountability of Universities for Federal Funds and the Effectiveness of Federal Audits."

Government witnesses and two university investigators painted a dismal picture of university accounting systems. University witnesses described the complexity of distributing and documenting faculty salaries, maintained that the crux of the problem was the excessive and unrealistic degree of precision demanded by the government, and encouraged the government to experiment with new ways to measure accountability.

Jerome Wiesner Addresses NCURA

In the meantime, in November of 1978, NCURA had assembled in Washington for its annual meeting. Those of you who were present may recall that Jerome Wiesner, then president of MIT, addressed the deteriorating federal relationship at the plenary session.

He expressed ". . . grave concern that the basic federal-academic relationship, after nearly three decades of the most fruitful partnership, is floundering. Indeed, it has begun to deteriorate and come apart so badly that we have reached a point of crisis that could see the effectiveness of the nation's major research universities seriously curtailed at a time when it sorely needs to be enhanced."

He listed a broad array of acts by Congress and the Executive which demonstrated the extent to which the relationship had eroded. He then cited proposed changes in OMB Circular A-21 not only as an example of the erosion of the partnership but also as a point of transition to a "quite different and less satisfactory liaison" which would "move us closer to the concept that universities are simply vendors . . . from which the federal government can procure services."

"I also acknowledge," he noted, "that there have been some isolated abuses, but not many and certainly not enough of them to justify the major changes that are being proposed. Such changes rather are directed at the basic underpinning of the government-university relationship."

"With the erosion of the old consensus on the inherent importance and contribution of basic research to the national welfare and in the absence of certified proof that it will produce immediately practical results in targeted areas of interest, basic research in recent years seems to have come to be measured primarily in terms of fiscal accountability and this has become a pervasive theme."

The Comptroller General on Fiscal *Accountability*

In the NCURA Newsletter in the summer of 1979, Elmer Staats, Comptroller General of the United States, discussed the issue of accountability and, after referring to Dr. Wiesner's speech, made the following comment:

> "Public pressure for fiscal accountability of university research is especially called for since the public understands little of what the research actually entails. Fiscal controls at least offer some degree of assurance that funds are being used as authorized on research."

Whether or not we agree with Elmer Staats' premise, we have learned that measuring research in terms of fiscal accountability is not only a pervasive but also a persistent and enduring theme.

1980s--ISSUES FOR UNIVERSITIES

As we move on into the 1980s) we enter the Reagan years-a period in which federal R&D support began to revive, especially for basic academic research.

There were new expectations that science and technology could improve the nation's economic competitiveness and contribute to state and local economic development. There was also a broadening

of support for research directed toward social problems such as health and the environment, as well as a growing research competition among the universities and colleges themselves.

A-2 1 -Capping Administrative Costs

As usual, there was no escape from issues related to A-21.

The greatest trauma was generated by the OMB proposals to cap faculty effort charged to departmental administration, which was implemented in 1986, and to establish a ceiling on administrative costs charged to overhead, eventually implemented in 1991 with a ceiling set at 26% of the direct cost base.

A Renewed Relationship

But let's take a breather from A-21 and Federal sponsorship and turn to another relationship that enjoyed a resurgence in the 1980s) that with industry. This renewed relationship, aided and abetted by the passage of the Uniform Patent Act in 1980, was well documented in the press, which give in-depth coverage to large awards such as the following:

The Hoechst Company of West Germany-$50 million to Massachusetts General Hospital for a Department of Genetics.

Monsanto-$23.5 million to Washington University for research in the medical uses of proteins and peptides.

W. R. Grace-$8.5 million to MIT for commercial applications of microbiology research.

DuPont-$6 million to Harvard Medical School to be used in its department of genetics.

Bristol Meyers-$3 million to Yale for production of anti-cancer drugs.

Media coverage, however, reflected mixed feelings and reservations concerning these new relationships. For example:

Time Magazine (September 1981): Pure Knowledge vs. Pure Profit-For universities, corporate research grants are a mixed blessing.

Science Magazine (May 1982): The Academic Industrial Complex-A host of new agreements for industrial sponsorship of academic research are the focus of a growing debate.

Business Week (December 1982): Business and Universities: A New Partnership-Colleges get funds, industry gets talent, but academic freedom may suffer.

Both within and without the universities there were concerned individuals who identified the risks:

-The risk to the open exchange of information

-The risk that universities would become corporate research arms solving short term problems for profit

- The risk that extensive corporate ties would generate conflicts of interest and erode public confidence in university faculty as disinterested seekers of truth.

Addressing the Risks

As it turned out, these were real risks and we had to examine whether our policies were adequate to deal with them.

We saw a growing tendency, particularly in the biotechnology field, for professors to own significant blocks of stock in commercial enterprises, to assist in their formation, or even assume substantial executive responsibilities.

We were called on more frequently to consider how a university may appropriately interact with a company in which a faculty member is involved.

We studied with great interest the debate as to whether Harvard University should invest in a biotechnology firm founded by a distinguished member of its faculty.

We pondered whether a professor should be allowed to accept research funds from a company in which he or she had a financial interest.

Conflicts Attract Attention

It was not long before perceived conflicts of interest, particularly those involving federal funds, caught the attention both of Congress and the press.

One of the more celebrated cases surfaced in late 1987 when stockholders in a small pharmaceutical company in the Boston area lost millions following the disclosure of negative research findings concerning a product the company hoped to commercialize-an ointment for treat-

ing a condition known as “dry eye.” The stockholders, in turn, brought a class action suit against the scientist who was conducting the research at a local institution and who also owned stock in the company. They discovered that he had had access to the negative data for some months and had already sold his own stock for a substantial profit.

You may recall that this and other alleged cases of conflict were examined in The Wall Street Journal and other media and were the subject of hearings by a House subcommittee chaired by Congressman Ted Weiss of New York.

NIH Conflict of Interest Regulations

Not long thereafter, in September of 1989, NIH proposed new guidelines on conflicts of interest as revisions to the NIH Guide and, shortly thereafter, retracted them at the direction of DHHS secretary Louis Sullivan. NIH subsequently used the normal proposed rulemaking procedures of the Federal Register in issuing the financial disclosure regulations which will presumably become effective in October of this year, after being harmonized with the revised NSF regulations.

This is another lesson we have learned. There are very few areas in which the public will hold us to a higher standard of conduct than those involving the integrity and objectivity of our research and of those conducting it. Consequently, the role of research administrators in recognizing and managing conflicts will remain critical.

Intellectual Property

As the industrial-university relationship grew, the legal and contractual issues required more complex negotiations and this was particularly true with intellectual property.

The negotiations for industrial contracts were frequently conducted by corporate patent attorneys and we wrestled with the issues of patent ownership, copyrights, computer software, publication rights, resolution of conflicts, product liability, indemnification, confidentiality of company data, and so on.

At a growing number of institutions, intellectual property negotiations were complicated by the need to integrate or coordinate them with licensing agreements or other advance understandings concerning the transfer of resulting technology. And not infrequently, to the dismay of a frustrated principal investigator, the research funding was held hostage while lawyers struggled over complex legal language.

Consequently, at the 1986 SUPA meeting in Alexandria, Virginia, which was well attended by corporate attorneys, I gave a talk in

which I urged that we facilitate the creative research process by keeping contracts lean and readable and not drafting them so as to anticipate every situation in which litigation was remotely possible. Otherwise, our agreements would sound just like the parody written by a gentleman named Paul Kern Hirsch, which reads as follows:

> "If a man were to give another man an orange, he would say, simply, 'Have an orange.' But if the transaction were entrusted to an attorney, he would say,
>
> "I hereby give, grant, bargain, and sell to you, all my right, title and interest in, of and to said orange, together with all its rind, skin, juice, pulp, and pips,
>
> "and all rights and advantages therein, with full power to bite, cut and otherwise eat of the same, or give the same away, with or without the rind, skin, juice, pulp or pips,
>
> "anything hereinbefore or hereinafter, or in any other deed or deeds, instrument or instruments, of whatever nature or kind whatsoever to the contrary in any wise notwithstanding."

But let's make it clear we're talking about "their" lawyers and not ours. We have learned to cherish our own lawyers because the legal complexities of intellectual property and technology transfer have made them indispensable partners in our negotiations. Nonetheless, we have a responsibility as research administrators to ensure that these complexities do not overwhelm the negotiations or the principal investigators.

Technology Transfer

As we moved on through the '80s and into the '90s, the technology transfer programs at many of our institutions grew in size and sophistication, sometimes as an integral part of the grant and contract office and sometimes as a separate office or legal entity. We now find ourselves slicing the intellectual output of our researchers into rights acquired by the sponsor, by the institution, by the government, and by the researcher, who may also have commitments to others, perhaps stemming from private consulting.

And we also find ourselves dicing this output into ownership rights, licensing rights, option rights, rights to biological materials and their progeny, computer software and its derivatives, and negotiating complex provisions with respect to royalties and/or equity interests.

As technology transfer activities grow, some of our institutions and faculty are asking whether there is a point at which the success of technology transfer as a revenue producer may in some way jeopardize the basic mission of the institution or adversely affect its relations with research sponsors.

The question was raised several years ago, for example, at a public university on the west coast where the multiple campuses were served by a central technology transfer office. The conclusion of an ad hoc advisory committee, based on a number of in-depth studies, was that the technology transfer program should be conducted as an integral function of each campus and based, in part, on the following principles:

-Technology transfer activities must be an integral part of the intellectual culture and research environment of the University. They must maximize ongoing research support, including industrial research collaborations, rather than eventual gains from patent income.

-Enhancement of research and education must be given the highest priority. In this regard, it is essential to have continuing and substantive faculty involvement in the technology transfer program.

How to maintain an appropriate balance between generating revenue and enhancing ongoing research support will depend on the circumstances and culture of the individual institution. The research administrator, however, has a responsibility to ensure that the issue is addressed.

1990s AND BEYOND

Well, so much for the past. What about the future?

Insofar as the war on the deficit is concerned, there is nothing I can add to what you already know-and this will change on a daily basis well into the fall. If you read The Boston Globe yesterday, you have one view of the potential impact of budget reductions on institutions in Massachusetts.

As for OMB Circular A-21 and indirect cost reimbursement, you know what's on the table. I will only add the following gloomy assessment from the Washington representative of one of our local research universities:

"This will remain a politically volatile, potentially damaging and divisive issue. It continues to pose serious long-term adverse impli-

cations for individual institutions and for the university research system as a whole. And the risks posed to the long-term health of the research enterprise may overshadow in importance the absolute dollars affected by changes which may be imposed by Congress in FY 96."

LESSONS LEARNED

Now, as we look ahead to a difficult future, it is time to examine what we have learned from the past.

Research and Accountability

We have learned that the project-grant system for funding academic research is highly and inherently vulnerable to inadvertent as well as willful abuse.

We have learned that the Comptroller General of the United States was accurate when he stated in 1978 that Congress and the public do not understand the research we perform and it has, therefore, been judged by fiscal accountability. It is for that reason that the single most influential factor in our relationship with the federal government for almost four decades has been an accounting document, OMB Circular A-2 1.

Not only has A-21 been the mechanism of choice in measuring financial accountability, it has also provided a convenient way to shift costs to the research institution, thereby transforming a partnership in which the government invested in research into a procurement relationship requiring precise cost accounting. This seems likely to be reinforced by OMB Circular A-l 10 and the Cost Accounting Standards.

We have learned that over and above fiscal accountability, our institutions are being judged by how rigorously they comply with regulations directed not only at how they conduct research but also at how the researchers conduct themselves. And we know that we will be held to an extraordinarily high standard where scientific integrity appears to be involved.

Compliance vs. Service

What we are saying, then, is that in our stewardship of federal funds we must set a standard that outshines Caesar's wife. The tough part will be to do this and at the same time convince our researchers that our primary goal is to enhance the conduct of their research.

I must admit to a long-standing worry that our researchers, suffering from accountability and regulatory overload, would shoot the messenger. Over the years, however, and discounting the near misses, I have been surprised at how infrequently that occurs. Even those who operate on the principle that it is much easier to seek forgiveness than to seek prior approval are declining in number. I suspect that when they read about colleagues who have stumbled inadvertently into a quagmire, the thought "There but for the grace of God go I" must cross their minds.

I am convinced that those who direct our research laboratories and centers have become acutely aware of the traps and pitfalls that lie in wait. They have increasingly sought help from those who can satisfy the requirements of accountability and compliance without smothering the research in excessive administration. This involves building confidence, trust and a mutual understanding of the needs of the research program and of those conducting it. In my view, this can best be achieved in a face-to-face and personal relationship.

Reengineering

At the same time, I am aware that a number of institutions are going through an exercise commonly characterized as "business process reengineering." I have read that "in a process-based world, home is where the process is, and it is not a physical space-think of it as kind of a virtual home."

I have only a limited idea of what that means since I have had little direct involvement in reengineering. Nonetheless, my intuition tells me that our faculty and research staffs are not likely to let their research administrators drift very far away into cyberspace.

On the other hand, research administration could benefit enormously to the extent that reengineering can improve those business processes which support the conduct of research-such as accounting, purchasing, and equipment management. This might, for example, involve upgrading those financial systems that do not share data, track purchasing commitments, or provide timely reports. In addition, improvements in information transfer could hopefully eliminate steps which are redundant or non-productive, such as excessive multiple approvals, turn-around delays, and duplicate data entry.

These and other improvements in business processes and information transfer could, in a major way, enhance both the conduct of the research and the ability of research administrators to ensure fiscal accountability.

A Moment of Truth for America

And if we finally succeed in eliminating issues of accountability and compliance from the public consciousness, then the press, the public and the Congress will hear a different story. Let me give you an example.

On May 2, 1995, a paid advertisement appeared in The Washington Post. It was placed there by an impressive group of CEOs from the country's most prestigious corporations. It was titled "A Moment of Truth for America" and it reads in part as follows:

> "Imagine life without polio vaccines and heart pacemakers. Or digital computers. Or municipal water purification systems. Or space based weather forecasting. Or advanced cancer therapies. Or jet airliners. Or disease resistant grains and vegetables. Or cardiopulmonary resuscitation (CPR).
>
> "We take for granted these and thousands of other technological breakthroughs that have made American society the most advanced in history . . .
>
> "But these breakthroughs didn't just happen. They are the products of a long-standing partnership that has, as a matter of national policy, fostered the discovery and development of new technologies . . . .
>
> "This partnership-the research and educational assets of American universities, the financial support of the federal government and the real world product development of industry-has been a critical factor in maintaining the nation's technological leadership through much of the 20th century.
>
> "Unfortunately, today America's technological prowess is severely threatened. As the federal government undergoes downsizing, there is pressure for critical university research to be slashed.
>
> "... it is essential that the federal government continue its traditional role as funder of both basic and applied research in the university environment.
>
> "As the Congress makes its decisions on university research, let there be no mistake: We are determining the 21st century today."

That story-a story of past achievements and of new and continuing contributions that our researchers are making to this country's scientific and technological leadership-is the one that should be heard.

You can make it possible.

Looking Back, Looking Ahead

Steven Smartt

Editor's *note:* This pager *is* based *on* an address *to the* Mid-America *region* of NCURA on *the* occasion of *its* 25th Annual Meeting, Indianapolis, Indiana, April 3, 1995.

Abstract. The benchmarks in the evolution of research universities include the founding of the uniquely American university, the shaping of federal research policy in the post-World War II era, and the marked expansion of federal funding. Near-term projections, however, show a closing of this expansionist period. The combination of political and economic pressures will lead to a greater concentration of funding in fewer universities. These circumstances allow speculation about predictions for the future of research universities.

The history of science and of scientific progress is usually described in terms of significant discoveries or development of new procedures. Research administrators, however, are prone to describe the results of their efforts in terms of dollar volume, number of grants and contracts, aggregate federal support to university-based research, and success rates for proposals. Although a post-World War II development, the roots of research in a university setting predate the Twentieth Century. This article presents some general observations on university research, including where it started and where it might be headed as an enterprise in the next few years.

When we look retrospectively at the events that have shaped university research, the following questions offer a framework for analysis: How did universities come to be intensively involved in research activities? Why did the federal government assume a major role in supporting research? What forces have shaped university-based research activities? And, finally, who have been the performers and how have the resources been distributed?

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The equivalent of the "big bang" origins of university research are most likely found in the centers of learning in Renaissance Europe. In the United States, the model for the modern research university is rooted in the unique nature of the American university, with its late Nineteenth Century amalgamation of the undergraduate college and the graduate school. The founding of Johns Hopkins in 1876 represented a new organizational structure wherein the German research university was integrated in the English undergraduate college.' The idea that teaching and research could and should be fostered in the same setting, each strengthening the other, was a foundation on which American higher education would expand and flourish. Why the German model for graduate education? These institutions had become "world famous for. . . joining teaching and research and for their. . . goal of producing . . . creative scholars and original investigators in every field of professional endeavor."[2] The first earned Ph.D. was not awarded in America until 1861, at Yale University, yet German universities had trained 10,000 Americans between 1815 and 1915 and thus were the training ground for most of the academic elite in this country.[3] This produced a collective ferment for imitation in American universities.

How did the federal government assume a role? The most often cited seminal document for the federal role in research in modern times is Vannever Bush's 1945 report in his capacity as director of the U.S. Office of Science, Research, and Development. Science--The Endless Frontier served as a blueprint for a federal investment in science and technology to accomplish three objectives: the war against disease, national security, and science for the public welfare.[4] Bush's words are yet sufficient today to guide federal commitment to research: ". . . without scientific progress no amount of achievement in other directions can insure our health, prosperity, and security as a nation in the modern world."' The Bush report framed a proposal for what became, just six years later, a new federal research agency, the National Science Foundation.

What forces have shaped university-based research activities? The expanding national economy in post-war years allowed the states to undertake a remarkable period of growth. The dual goals of access and opportunity for all capable citizens to pursue higher education brought new campuses and the expansion of existing universities. With this growth came pressures for more campuses to offer more advanced programs, and faculty who sought to replicate their own graduate research programs.

This influence was modest, however, in comparison to the dramatic growth of federal funding. Although comparisons over time are

difficult due to inconsistent tabulations, one source shows the federal government spent $31 million (current dollars) for research in 1940.[6] In 1965, the government spent a combined $1.6 billion in the categories labeled general science and basic research, and health research and training. In fiscal year 1995 these categories were projected to spend $15.8 billion.[7]

Who have been the performers? Documentation of the recipients of federal research support fifty years ago is not readily available. More recent data show that in 1974, federal obligations to universities for research and development totalled $4.4 billion, with two-thirds of those obligations going to the top 100 recipients. One dollar in six (16%) went to the top ten recipients.[8] By 1991, just seventeen years later, federal obligations to universities for R&D had more than doubled, to $10 billion. More significant, however, was the discernable concentration of a larger share of the dollars in fewer institutions: the top 100 institutions received 84% of the funding, and the top ten universities received almost one dollar out of every four (23%).[9] Thus, while it may be true that more universities are participating in some form of federal research funding, the funding is more concentrated in fewer schools.

These historical checkpoints and trends tell us something about where we have been, but what about where we are going? We know that these trends cannot continue in straight-line fashion. Indeed, we can see a significant change in policy and in funding in the near-term projections for federal funding. As we look forward to the next ten to 15 years, three basic questions are relevant: What forces will shape research policy and the funding of research in universities? What issues will define university-based research? And, who will be the performers?

The forces that will shape the nature of university research in the coming years are directly related to popular beliefs about the role of government, economic conditions, the capacity of the government to set priorities among competing demands, and expectations for the benefits of investments in research.

In the broader societal context, there are a number of trends that can affect the partnership between research universities and the sponsors of research. Three generally perceived patterns bear mentioning: the general public now expects more from government than government can provide; the recipients of government funds (including research performers) are adamant about keeping if not expanding the benefits they now receive and resist any hint of retrenchment; and, third, we are an increasingly litigious society. The influence of litigiousness is mentioned because it is not unrelated to the regulatory burden on research

activities. This can result in preventive or "defensive" behavior in which organizations take fewer risks, not unlike a physician practicing defensive medicine to avoid a lawsuit for malpractice.

While there are indications that public support for research is high, especially for health and disease-related research, the stark reality remains that the federal government will not be able to continue to be an ever expanding source of funding for research. Today, fully two-thirds of the federal budget is devoted to non-discretionary obligations, including social security, medicare, medicaid, and net interest. The remaining one-third, i.e., the discretionary budget, is about evenly divided between defense and domestic programs. Some see ominous implications from the convenient comparability in the size of the domestic discretionary budget (projected to be approximately $250 billion in FY96) and the estimated deficit for that same year (approximately $200 billion). Indeed, because the costs of debt service will work counter to efforts to manage or reduce the size of the annual deficit, the federal projections for discretionary budget items of interest to research universities show generally slower growth or even declining resources for the next five years."

What tentative conclusions might one draw from these trends and realities? Recalling the maxim about the difficulty with predicting the future, namely that it hasn't happened yet, I would offer five observations that can be used to monitor the next 10 years. Listed in order from the obvious to the tentative, they are:

1. Politics and the economy will be the predominant determinants of research support. As of this writing we do not fully know how the 104th Congress will treat research; however, the sentiments are clearly strong to reorder national priorities. The tussle between the Clinton administration and the Congress over a balanced budget is the most profound illustration of this point. Even a small adjustment in assumptions about inflation and economic growth can produce a significant ripple in funds available for federal domestic discretionary spending.

2. There will be increased regulatory pressures. In spite of occasional moratoria on the issuance of regulations or anti-regulatory sentiments of some elected officials, participation in federal programs will always be a conduit through which incremental rules and regulations flow along with the dollars. Some observers characterize requirements such as the application of Cost Accounting Standards to universities as "drive-by" regulations, issued during a reactionary period in an indiscriminate fashion.

3. Indirect cost issues will not go away unless and until the research community abandons the idea of finding a technical solution to a political problem. Perennial debate on the merits and limitations of indirect cost methodologies represents an ever present prospect for dividing public institutions against private ones, medical campuses against others, and researchers and their professional associations against university administrators. Fixation on this topic is at once distracting and detracting from more central concerns, such as total available resources or national goals for research.

4. There will be more concentration of research dollars in fewer performers, continuing a trend of the past two decades. The principal players will become still more dominant in terms of the share of funding they attract, notwithstanding congressional earmarking of funds or agency programs to develop research capacities in certain groups of institutions. As resources become more scarce and concentrated, some form of a "market shake out" will occur in which some current participants will no longer receive federal research funding.

5. We will witness relatively short cycles, perhaps two to three years each, of pendular swings in federal interest between basic research and directed research. Universities can temper the ambiguity produced by these signals by affirming what university research is and is not, and avoiding the temptation to be all things. Research universities can best serve national interests and academic ideals by standing firm on the things they do best: advancing fundamental knowledge, objectively examining applications for research, and training future scientists and scholars.

Some years ago an annotated bibliography was compiled of simulation exercises in higher education. One entry was modeled after the popular board game, "Monopoly." The author of this particular game asserted that it was not a bona fide simulation because the outcome was more dependent on luck than skill. The editor of the bibliography countered, however, that the element of luck may actually have brought to that simulation a measure of realism. This can serve as a reminder that elements other than skill can affect the outcomes predicted above.

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Using Institutional Variables to Predict Success in the Acquisition of Sponsored Projects

Thomas C. Monahan and Jim C. Fortune

Abstract. This national study of colleges and universities examined thirty-three variables found to act as incentives to motivate faculty to engage in sponsored project activities. The results of a series of statistical analyses suggest that a small, but significant, predictive relationship exists between the provision of institutional resources for released time to write proposals, reduced faculty loads to work on funded projects, graduate and research assistants, a return of some of the indirect costs to faculty or sponsoring departments, and other selected resources and services, and success in the acquisition of sponsored projects as measured by the amount of funding attracted to the institutions in successful awards.

BACKGROUND OF THE STUDY

Several recent studies identify factors which serve as incentives or disincentives to college and university faculty participation in sponsored projects activity (Monahan, 1993; Davis & O'Hanlon, 1992; Stahler & Tash, 1992; Snyder, McLaughlin, & Montgomery, 1990; Daniel & Gallaher, 1990; Mishler, 1989). While these studies are useful in identifying factors that are said to help and hinder the acquisition of sponsored projects, each possesses certain limitations. For example, Monahan's 1993 study identified barriers and inducements to faculty participation in grants and sponsored activity, but only within the New Jersey state college system. Davis & O'Hanlon (1992) surveyed grants and contracts activity among colleges of education only. Stahler & Tash (1992) studied incentives and impediments to

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grant development, but only at the nation's fastest growing research universities; Snyder, McLaughlin, & Montgomery (1990) conducted a national survey of outstanding research universities which focused only on successful management practices in encouraging faculty research. Daniel & Gallaher (1990) studied impediments in grant-related activity, but only in a small sample of education faculty. Mishler (1989) examined only the steps necessary for the transition from predominantly teaching institutions to those in which the focused emphasis is placed on acquisition of sponsored research funds.

Having identified the motivating and inhibiting variables, the next reasonable question is whether the addition of incentives or the removal of barriers have any measurable effect on the success of sponsored projects acquisition. The purpose of this research was to conduct a nationally representative study of support mechanisms for sponsored projects that were provided by colleges and universities using their own as opposed to sponsors' resources, the types of policies and practices of the colleges and universities that supported sponsored projects activity, and the kinds of training and services provided by the campus grants, sponsored projects or research administration offices. Moreover, we wanted to determine if there is a connection between the institutionally-funded services, policies, and training provided by colleges and universities and success in sponsored projects acquisition as measured by the percent of proposals submitted that received funding and/or by the amount of funding that was received in successful awards.

Specifically, the objectives of this study were:

1. to conduct a nationally representative survey of colleges and universities to determine the nature and frequency of institutionally-funded financial and other resources that are provided to support faculty participation in sponsored projects activities;
2. to determine the extent to which selected institutional policies and practices which tend to influence sponsored projects activity are provided by colleges and universities;
3. to determine the extent to which selected training and other services in the development of sponsored projects are provided by colleges and universities; and
4. using the percent of successfully funded proposals and amount of dollars awarded in funded proposals as dependent criterion values, to determine whether institutionally-funded support services, college or university policies and practices, and training

and other services accurately predict success in the acquisition of funds for sponsored projects.

SAMPLE PROCEDURES AND SURVEY METHODOLOGY

Two separate samples were drawn for this study. The first sample was identified from the colleges and universities who participated in the 1992 Benchmarking Project conducted by the National Association of College and University Business Officers (NACUBO) and Coopers & Lybrand. There were 112 institutions participating in the study, and 84 (75%) provided information about their sponsored projects activities, including the number of proposals submitted and awarded and the amount of funding requested and received. All of the institutions which provided sponsored projects information were selected with certainty. The second sample was identified through a systematic random selection of colleges and universities whose representatives were members of the National Council of University Research Administrators (NCURA) and who were listed in the 1993 NCURA member directory. After removing institutions that were already included in the survey sample by virtue of their participation in the NACUBO study, 354 colleges and universities remained, and 79 (22%) were systematically selected for inclusion in the sample. The combined population, therefore, included a total of 466 colleges and universities from all 50 states and the District of Columbia. A total of 163 institutions, representing 42 states and the District of Columbia, were selected randomly into the combined sample, which was expected to have at least 90% confidence with a margin of error of ±.05 (McCall, 1990). The sample was checked to ensure national representativeness according to such characteristics as geographic region, type (research vs. non-research), and control (public vs. private).

Survey (mail) questionnaires were developed, field-tested, and distributed to the directors or managers (in some instances, deans and vice provosts) of grants, sponsored projects, or research administration offices who were identified in either the 1992 Benchmarking Project report or the NCURA Directory.

INSTRUMENTATION

Two very similar survey questionnaires were used in this study. The first, which was sent only to institutions in the NCURA sample,

requested specific data on the number of proposals for externally sponsored projects that were submitted during FY 93 (i.e., July 1, 1992-June 30, 1993) by a college or university faculty or staff member, and how many of these proposals resulted in awards. Similarly, the NCURA sample was asked to provide specific data on the number of dollars that were requested in the FY 93 proposals, and how many dollars were actually awarded. Respondents were instructed to include only information regarding grants and sponsored projects; contracts and fee-for-services projects were excluded from consideration in this study. Because the information about the number of proposals submitted and awarded and the number of dollars requested and granted was already available from the I992 Benchmarking *Project* report, these data were not requested from institutions included within the NACUBO sample. An unobtrusive coding device permitted us to identify the completed survey instruments from institutions in the NACUBO sample so that we could match their responses with their proposal and funding data recovered from the I992 Benchmarking *Project* report.

The combined sample was asked to respond to a number of questions regarding the nature and type of institutional support features that are available on their campuses. Specifically, all colleges and universities in the study were asked whether their campuses had a functioning grants, sponsored projects or research administration office. They were further asked about the different kinds of institutionally-funded financial and other resources that were available on their campuses that support sponsored project activities. Included within the financial resource category were questions about *institutional* (i.e., internal) funding for faculty travel to professional meetings; equipment and technology that supports sponsored projects; funding for faculty development or faculty renewal projects; merit pay for successful faculty grantees; and matching funds to support institutional proposals. Included within the other resource category were questions about released time for faculty from regularly assigned teaching activities, student advising responsibilities, and committee assignments; graduate or research assistants to help faculty prepare proposals or to work on successful sponsored projects; and extra administrative (e.g., secretarial) help for faculty engaged in sponsored projects activity. The operative word in all of the questions in these categories was *institutional.* Respondents were clearly instructed to answer questions about resources provided by their college or university *from within its* own sources, as opposed to sponsor-funded.

In addition to financial and other institutional services, respondents were asked to indicate the presence of institutional policies or practices that may affect sponsored project activities. Specifically, informa-

tion was sought about whether institutions provided clearly visible support mechanisms for sponsored projects; whether their institutional mission statements included language which demonstrated clear support for externally sponsored activities; whether college and university campuses provided environments where faculty could pursue sponsored projects of their own choosing without administration pressure; and whether the institution provided a streamlined administrative process for reviewing and approving proposals for externally sponsored projects. Respondents were also asked to indicate whether their colleges and universities provided a clear system of recognition and rewards for faculty who were successful in securing funds for sponsored projects, and whether their colleges and universities had a process which provided for the distribution of indirect costs attracted to the institutions by successful sponsored projects to the faculty and departments responsible for securing and implementing the external funding.

Finally, respondents were asked to respond to a series of questions about the services available in their campus grants or sponsored projects offices and what training services were offered for faculty. Specifically, respondents were asked to indicate whether their grants, sponsored projects, and research administration offices motivated faculty to prepare proposals for externally funded projects; provided boilerplate writing and editing services for faculty proposals; shepherded faculty proposals through the administrative review and clearance processes; provided timely notification of sponsored project opportunities; maintained faculty interest profiles and assisted in networking faculty with similar research, grants or scholarly interests; and provided access to on-line computerized databases of potential external sponsors. Respondents were further asked to report whether their grants, sponsored projects, or research administration offices provided training in how to familiarize faculty with sponsored project opportunities; how to locate suitable external sponsors for their ideas; how to prepare competitive proposals and accurate budgets; and how to remain informed about proposal review and approval policies. In all, there were thirty-three questions asked that would later serve as univariate variables in the data analysis phase. For all of these questions, respondents were asked to answer by checking an always, sometimes (or somewhat), and never (or none) option.

RESPONDENT CHARACTERISTICS

Usable surveys were returned by 104 of the 163 colleges and universities sampled, a response rate of nearly 64%. Checks were per-

formed of the pre-addressed postal cards (included with the survey questionnaires) that were returned independently of their completed survey instruments that determined that returns were evenly distributed across the national sample. This check further suggested that there was neither substantial over-representation nor under-representation among the respondents on the basis of geography, type, or control. Telephone calls were made to a randomly selected sample of non-respondents which indicated that no systematic non-response bias was present.

DATA ANALYSIS

Both proposal and financial award data were analyzed to compute percentages of proposals funded and dollars awarded in funded projects. For purposes of analysis, these percentages were then grouped as follows: an above average category was identified when the percentage of proposals funded and dollars awarded exceeded 69%; an average category was identified when the percentage of proposals funded and dollars awarded was between 50%-69% inclusive; and a below average category was identified when the percentage of proposals funded and dollars awarded fell below 50%. These groupings are presented below in Table 1.

The data in Table 1 show that, for both the percentage of proposals funded and for percentage of dollars awarded, approximately 30% of the respondents obtained more than 69% of the proposals submitted and dollars requested, approximately 40% of the respondents obtained

TABLE **1.**

DESCRIPTIVE STATISTICS: MEASURES OF SUCCESS IN GRANTS ACQUISITION

Percentage of Proposals Funded	N	Percent
Greater than 69%	28	29.8
50%-69%	40	42.6
Less than 50%	26	21.1
Percentage of Dollars Awarded in Funded Grants	N	Percent
Greater than 69%	28	30.4
50%-69%	36	39.1
Less than 50%	28	30.4

between 50% and 69% of the proposals submitted and dollars requested, and the remaining 30% of the respondents obtained less than 50% of the proposals submitted and dollars requested. In this study, no distinction was made between new or continuing (non-competitive) sponsored projects. This may have resulted in greater success rates in both the percentage of proposals awarded and/or the percentage of dollars awarded than otherwise might have been anticipated.

Among the respondent institutions, 88% reported that they had fully functioning grants, sponsored projects, or research administration offices on their campuses; 9% reported that such offices were present, but may not be fully functioning; and 3% reported that no such offices existed on their campuses.

Descriptive statistics for the remaining 32 survey variables have been grouped together in five categories as follows: institutional (i.e., internal) financial resources provided in support of sponsored project activity; institutional policies and practices influencing sponsored project activity; training services provided by colleges and universities to support sponsored project activity; and other services provided by colleges and universities for sponsored activities.

The data in Table 2 suggest that most colleges and universities sometimes provide funding from their own resources to support activities associated with the pursuit by faculty of externally sponsored projects. Of particular interest is the fact that over half (52%) of the

TABLE 2.

INSTITUTIONAL FINANCIAL RESOURCES PROVIDED BY COLLEGES AND UNIVERSITIES

	Always	Sometimes	Never
Financial support for faculty travel to professional association conferences, meetings, workshops, or seminars	30	67	3
Equipment or technology (e.g., labs, computers) which support sponsored activities	21	78	1
Financial support for faculty development or faculty renewal opportunities	16	81	3
Merit pay or other forms of personal financial compensation for faculty who receive grants for externally sponsored projects	6	42	52
Matching funds or other tangible forms of institutional commitment for proposals to external sponsors	17	79	4

respondents reported that their colleges and universities never provide merit pay or other forms of financial compensation from institutional sources as a reward for their successfully externally supported projects, while 42% reported that such reward is sometimes provided, and 6% reported that such reward is always provided.

Table 3 provides information on the extent to which colleges and universities provide other institutional services to support sponsored project activities. As this table illustrates, the majority of colleges and universities sometimes provide reduced teaching duties, reduced advising responsibilities, or reduced committee assignments for faculty to prepare proposals or for faculty who have been awarded funds for externally sponsored projects. Similarly, most institutions sometimes provide graduate or research assistants to assist faculty in sponsored project activities or to work on successful projects. Finally, most colleges and universities *sometimes* provide additional administrative staff to help faculty engaged in sponsored project activities. These data further show that few colleges and universities always offer these serv-

TABLE 3.

OTHER INSTITUTIONAL RESOURCES PROVIDED BY COLLEGES AND UNIVERSITIES

	Always	Sometimes	None
Released time from regularly assigned teaching duties for faculty to prepare proposals for externally sponsored projects	6	62	32
Released time from student advising and/or committee assignments to prepare proposals for externally sponsored projects	6	48	46
Reduced teaching duties for faculty who have been awarded externally sponsored projects	9	72	19
Reduced student advising loads for faculty who have been awarded externally sponsored projects	3	62	35
Reduced committee assignments for faculty who have been awarded externally sponsored projects	3	56	41
Graduate or research assistants to help faculty in sponsored project activities	0	58	42
Graduate or research assistants to help faculty who have been awarded externally sponsored projects	8	73	19
Additional administrative or personnel support (e.g., secretarial help) to faculty engaged in sponsored project activity	8	70	22

ices, and many (in some cases, a substantial percentage) institutions never provide these services.

Table 4 provides information on the extent to which colleges and universities provide institutional policies or practices which support grant activities by their faculty. The data suggest that the majority of colleges and universities provide visible support mechanisms, mission statements supportive of externally funded projects, pressure-free environments, and streamlined administrative review procedures. Moreover, a majority of institutions always provide a process for sharing indirect costs. However, the data clearly show that most institutions do not offer merit pay or other forms of financial compensation to faculty who are successful in attracting funding for externally funded projects.

TABLE 4.

INSTITUTIONAL POLICIES AND PRACTICES OF COLLEGES AND UNIVERSITIES

	Always	Sometimes	None
A commitment to and value for and sponsored projects by consistently providing clearly visible support mechanisms	62	36	2
A mission statement which shows clear support for externally sponsored activities	57	27	16
An environment for faculty to pursue sponsored opportunities of their own choosing without administration pressure	67	32	1
A streamlined administrative review process which facilitates the processing of proposals for external funding	75	22	3
A clearly visible and articulated recognition and reward system for faculty who are successful in winning externally sponsored projects	21	57	22
A process for returning at least a portion of the indirect or administrative costs associated with successful awards to the principal investigator or project director (or to the academic departments in which these faculty are members)	54	26	19

Respondents were asked to comment on the nature and frequency of services provided by their college or university grants, sponsored projects, or research administration offices. Their responses are illustrated in Table 5.

TABLE 5.

SERVICES PROVIDED IN SPONSORED PROJECT TRAINING SESSIONS OR WORKSHOPS

	Always	Sometimes	Never
Familiarize faculty or staff with sponsored opportunities	55	36	9
Teach faculty or staff how to locate potential sponsors	50	38	12
Teach how to write competitive proposal narratives	40	44	16
Teach how to prepare reasonable budgets	52	36	12
Inform writers about the campus proposal approval process	66	28	6

The data in Table 5 suggest that training in familiarization with sponsored opportunities, locating potential sponsors, writing competitive proposals and budgets, and becoming and remaining informed about campus proposal approval processes is provided either always or *sometimes* at the respondents' institutions. Generally, less than 16% of the respondents suggested that such services are never available at their institutions.

Finally, respondents were asked to answer a series of questions about the nature and frequency of services offered at their colleges and universities. Their responses, presented below in Table 6, show that most colleges and universities provide services which motivate faculty, inform about sponsored opportunities in a timely way, assist faculty in preparing competitive proposals, shepherd completed proposals through the administrative clearance procedures, and provide on-line access to sponsored opportunities. However, fewer institutions provide editing services or boilerplate sections for faculty proposals or reports, assist faculty to network with others with similar interests, or maintain faculty profiles defining research or scholarly interests.

The final objective of the study was to determine if a predictive relationship exists among the resources, policies, services, or training provided by colleges and universities and achievement or success in the acquisition of sponsored projects, as measured by the percentage of proposals funded or the amount of dollars awarded in successful projects. In analyzing the data to address this objective, we acknowledge that the variables under study are not the only ones that may influence sponsored project activities or acquisition, Moreover, we recognize that the variables may not work as univariates in influencing success in attaining external funding, but instead may work as multivariates. Suffice it to say that we chose these variables based on

TABLE 6.

SERVICES PROVIDED BY COLLEGE OR UNIVERSITY GRANTS, SPONSORED PROJECTS, OR RESEARCH ADMINISTRATION OFFICES

	Always	Sometimes	Never
Motivate faculty or staff to engage in sponsored projects activities	73	19	8
Provide editing services for proposals or reports	43	35	22
Shepherd proposals through the campus proposal approval process	76	21	3
Provide timely notification of opportunities and deadlines	73	24	3
Assist in networking faculty with similar research or scholarly interests	41	51	8
Maintain faculty profiles defining individual research or scholarly interests	36	50	14
Provide access to computerized on-line databases which facilitate searches for grants and sponsored project opportunities	65	22	13
Provide boilerplate sections of proposals (e.g., institutional description) to assist proposal writers	40	51	9

our review of the research literature and our own logic and understanding of sponsored projects in higher education. Moreover, as the succeeding analyses and discussion will show, we used both univariate and multivariate tests to determine whether predictive relationships are observed.

We sought to address the predictive relationship between the independent variables (resources, policies, services, etc.) and the dependent variables (percent of proposals funded, amount of dollars awarded) through both univariate and multivariate analyses. First, a series of chi-square tests were run on the family of thirty-three independent variables found to influence success in sponsored projects acquisition. Two analyses were run: one using categorical variables created from the percentage of proposals funded as the dependent variable, and another using the percentage of dollars awarded as the dependent variable. These categories have previously been described in Table 1.

In the first analysis, three independent variables were found to be significantly related to the dependent variable percentage of proposals funded. They are: equipment or technology which support sponsored

project activities, the return of at least a portion of the indirect costs to the individuals responsible for getting the external funds, and training in the campus proposal approval process. The chi-square statistics are reported in Table 7.

TABLE 7.

INSTITUTIONAL VARIABLES SIGNIFICANTLY RELATED TO SUCCESS IN SPONSORED PROJECTS ACQUISITION AS MEASURED BY THE PERCENT OF THE PROPOSALS FUNDED

Variable	X^2	df	n	p
Equipment or technology (e.g., labs, computers) which support sponsored activities	7.29	2	94	0.026
A process for returning at least a portion of the indirect or administrative costs associated with successful awards to the principal investigator or project director (or to the academic departments in which these faculty are members)	15.163	4	94	0.004
Training about the campus proposal approval process	12.847	4	94	0.012

In the second analysis, ten independent variables were found to be significantly related to the dependent variable percentage of dollars awarded. They are: released time from regularly assigned teaching and advising duties and committee assignments to prepare proposals; reduced advising responsibilities and committee assignments to work on successful externally funded projects; graduate or research assistants both for proposal development and work on successful projects; the return of at least a portion of indirect costs associated with successful projects to the project director or the academic department in which the project director is a member; proposal editing services, assistance in networking faculty with similar research or scholarly interests, and access to on-line computerized database searching services. These data are presented in Table 8.

In considering further analyses, we asked whether the independent variables used in the study as possible predictors were related to the dependent variable as independent characteristics or whether one or more of them were interchangeable. To answer this question, we converted the independent (univariate) variables already organized in the five groupings into scaled (multivariate) variables to determine if the scaled variables were significantly related to the dependent variable. The descriptive summaries appear below in Table 9.

TABLE 8.

INSTITUTIONAL VARIABLES SIGNIFICANTLY RELATED TO SUCCESS IN SPONSORED PROJECT ACQUISITION AS MEASURED BY THE NUMBER OF DOLLARS AWARDED FROM SUCCESSFUL GRANTS

Variable	X^2	df	n	p
Released time from regularly assigned teaching duties for faculty to prepare proposals for externally sponsored projects	29.582	4	92	0.000
Released time from student advising and/or committee assignments to prepare proposals for externally sponsored projects	26.915	4	92	0.000
Reduced student advising loads for faculty who have been awarded externally sponsored projects	26.507	4	92	**0.000**
Reduced committee assignments for faculty who have been awarded externally sponsored projects	35.074	4	92	**0.000**
Graduate or research assistants to help faculty in sponsored project activities	8.916	2	92	0.012
Graduate or research assistants to help faculty who have been awarded externally sponsored projects	10.839	4	92	0.028
A process for returning at least a portion of the indirect or administrative costs associated with successful awards to the principal investigator or project director (or to the academic departments in which these faculty are members)	10.990	4	92	0.027
Provide editing services for proposals or reports	18.535	4	92	0.001
Assist in networking faculty with similar research or scholarly interests	10.489	4	92	0.033
Provide access to computerized on-line databases which facilitate searches for sponsored project opportunities	11.140	4	92	0.025

In Table 9, each of the independent variables in the scaled variable groups was weighted from 3 (always) to 0 (never or none) and summarized. The mean response for each of the scaled variable groups was then calculated. The results suggest that all of the scaled groups are provided, on average, at least sometimes. Based on the mean values observed, it appears that the discrete items for institutional policies and practices, training services, and other college services appear to be provided more frequently than the discrete items for the financial and other resources.

Having converted the independent variables to scaled variables, we conducted a series of Pearson correlation tests to determine if there

TABLE 9.

DESCRIPTIVE STATISTICS FOR SCALED VARIABLES

Scaled Variable Group	N	Mean	Stan Dev
Institutional financial resources provided by colleges and universities	104	6.27	2.674
Other institutional resources provided by colleges and universities	104	6.30	3.229
Institutional policies and practices of colleges and universities	104	9.68	4.925
Services provided in sponsored project training sessions or workshops	104	6.14	5.010
Services provided by college or university grants, sponsored projects, or research administration offices	104	11.93	3.892

was a statistical relationship between the different categories of scaled variables and success in the acquisition of sponsored projects. When using the amount of dollars awarded as the dependent variable, we observed that other institutional resources provided by colleges and universities were positively related ($r=.366$, $p<.05$). This suggests that released time, reduced assignments, graduate and research assistants, and other forms of administrative support are significantly predictive of success as measured by amount of dollars awarded.

We conducted an additional series of analyses to further test whether the independent variables used in the study worked in a multivariate fashion rather than in a univariate mode. These included a series of multiple regression and discriminant analyses using the univariate and scaled variables to predict success using both dependent measures.

In the multiple regression analyses with the univariate variables as predictors, the stepwise model was applied to both dependent measures. The results of the stepwise multiple regression using the univariate variables to predict percentage of proposals funded are generally consistent with the chi-square analyses. The analysis explained nearly 11% of the variance, and two variables were found to be significantly predictive of success: the provision of equipment or technology to ‘support sponsored projects acquisition ($p<.017$) and reduced advising loads for faculty successful in acquiring external funding ($p< .019$).

The results of the stepwise regression analysis with the univariate variables as predictors of dollars awarded suggest that the provision of released time and assistance in networking faculty with similar research or scholarly interests are small, yet significant, predictors.

Using the scaled variables to predict the percentage of proposals awarded was disappointing in that none of the scaled variables proved to be sufficiently predictive. However, using the scaled variables to predict sponsored project success as measured by the amount of dollars awarded was more promising. The analysis showed that the provision of institutional resources (e.g., released time, reduced loads) and sponsored project training services were predictive of success when measured in dollars awarded.

Only one of the discriminant analyses we conducted proved useful. Using the univariate variables to predict whether respondents could be categorized as having acquired total dollars either above or below the mean of the entire sample, the analyses suggested that six variables were predictive. These included released time from advising and committee assignments to work on preparing proposals, sponsored project training in proposal writing and budget development, and services provided by the institutions in shepherding proposals through the administrative clearance process, in developing faculty profiles, and in help ing to network faculty with similar research or scholarly interests.

DISCUSSION

The descriptive data suggest that most colleges and universities consistently support the sponsored project activities of their faculty more in ways that do not require the expenditure of institutional resources and less in ways that do. This confirms earlier findings by Monahan (1993, p. 13). We note this because of the finding that the majority of respondents reported that their institutions always provided clearly visible support systems and mission statements that supported externally funded projects, pressure-free environments, and streamlined administrative procedures for proposal approval and clearance. In contrast, however, the majority of respondents reported that their institutions only sometimes, and in some cases, never, provided from within their own financial resources released time to prepare proposals, reduced faculty loads to work on successful sponsored projects, funds for faculty travel or faculty development, equipment or technology to support sponsored project activity, merit pay, matching funds, graduate or research assistants, or other administrative support. We further note an apparent discrepancy in the data which, on the one hand, reports that institutions always show a commitment to and value for sponsored project activity by consistently providing clearly visible support mechanisms, and on the other hand, suggest strongly

that such "clearly visible support mechanisms" are not always financially supported from within the institutions' resources. These findings suggest that institutions may prefer to look to successful sponsored projects to fund released time, reduced faculty loads, and other resource-consuming incentives as a way to avoid having to expend institutional resources.

Another finding that appears consistent with issues in the national debate is the report that institutions infrequently provide clearly visible and articulated recognition and reward systems, including merit pay, for faculty who are successful in winning externally funded projects. Moreover, the data show that many institutions (45%) only sometimes or never return even a portion of the indirect costs derived from successful externally funded projects to those individuals and departments who were instrumental in acquiring the projects.

The descriptive data further suggest that campus grants, sponsored projects, or research administration offices are helpful both in provide ing training in sponsored project activities and in providing other services to faculty which support their entrepreneurial efforts.

The question that remains is whether the provision of any of these institutional resources, policies, services, or training has any measurable effect on the acquisition of funds from external sources. It is not unreasonable for college and university administrators to pose this question before embarking on a path which requires the expenditure of considerable financial and other resources.

Few of the univariate or multivariate analyses (i.e., chi-square, correlation, regression, discriminant) proved useful in showing a predictive relationship among the independent variables and success in sponsored project acquisition as measured by the percent of proposals funded. Those which did, however, suggested a small, yet significant, relationship between the predictor variables of (a) equipment and technology for sponsored project activities; (b) return of a portion of the indirect costs to faculty or sponsoring departments; (c) training in the campus proposal approval process; and (d) reduced loads for student advising and committee work to implement successfully funded external projects. Other analyses suggested that some of the variables under study do have a significant predictive relationship with success in the acquisition of sponsored projects as measured by the amount of dollars awarded. The chi-square and regression analyses of both the univariate and scaled variables suggest that the provision of institutional resources for released time to prepare proposals, reduced faculty loads to work on successfully funded external projects, equipment and technology for sponsored project activity, and graduate and research

assistants are positively related with success in sponsored project acquisition as measured by amount of dollars awarded. Moreover, the return of indirect cost proceeds is positively related to this criterion. Only one of the four discriminant analyses we ran proved useful, and it was consistent with our earlier findings that the provision of selected institutional resources and services did possess a significant predictive relationship with success in sponsored project acquisition.

SUMMARY

The results of this study suggest that most colleges and universities provide more in the form of policies, practices, training and other services than financial and other institutional resources (e.g., released time) as incentives for faculty to engage in sponsored project activities. Nevertheless, the data suggest that, when measuring success in the acquisition of external funds by the amount of dollars awarded in funded projects, there is a small, yet significant, predictive relationship between selected variables and sponsored project success.

This article has been abbreviated somewhat to meet the publishers' space requirements. Copies of the complete study *may* be obtained by writing to either author.

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Defense Conversion and Brokering Partnerships: A New Role for the University Research Administrator

Richard B. Streeter

Abstract. The history of defense conversion is intertwined with university, industry and federal laboratory research. Initially, universities received most of their research funding from the federal government. In the 1980s, the picture became more complicated as industry began to fund more research at universities. In the 1990s after the Federal Technology Transfer Act of 1986, the federal laboratories began to form partnerships with both universities and industry. This latter development reached its high point with the end of the cold war and the beginning of the peace dividend. Today the emphasis is on defense conversion.

As the funding for research changed in its complexity, the role of the university research administrator also changed. The purpose of this article is to examine the role of the university research administrator in the search for defense conversion funding.

BACKGROUND

In 1945, the Vannever Bush Report: Science--The Endless Frontier, and the government's response to it, set the course for policy on science and technology for the next fifty years. During that time, the primary funding source for university research was the federal government. While the federal relationship remains intact, it has had its peaks and valleys, not only in levels of funding, but in enlightened self-interest as well. The saga of intellectual property rights is representative of this relationship. Through the late '7Os, only selected universities were doing cooperative research with industry, The question that was generally asked of these institutions was:

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WHY DO YOU DO RESEARCH WITH INDUSTRY?

For many years, the federal government insisted that all intellectual property rights remain with the federal sponsor. These rights to technology were subject to severe licensing restrictions. Exclusive licenses were, and still are, difficult to obtain from federal agencies. A university did (and still does) have the option of filing for "greater rights." However, even if the university was granted these rights, there still remained severe restrictions on the options available for licensing technology. As a result, most technology developed by federal grants and contracts remained "on the shelf' because corporations were not willing to invest the enormous amount of dollars necessary for R&D only to have competition obtain a non-exclusive license to the technology.

The university community lobbied for many years to promote changes in the federal patent laws. Simultaneously, NASA began an experiment which subsequently showed that technology transferred to universities reached commercialization at a much more rapid rate than technology held by the government.

In 1980, the United States Congress enacted PL 96-517, which vested in the institution the patent rights to inventions if the institution requested those rights at the time of disclosure. A GAO study in 1986' cited several positive results of the law and its subsequent counterpart, PL 98-260.

The study showed that: (1) Universities entered into licensing agreements with private companies with greater ease than with the federal government because they were better equipped to deal with proprietary information and rights. Companies knew initially who had title to the invention; therefore, universities had more control over disposing of inventions. (2) Private companies and university representatives collaborated more. Companies were more willing to discuss inventions and give institutions funds to further develop them. (3) Inventors were more interested in inventions and technology transfer than their federal counterparts. (4) Federal agencies' regulations were more uniform; therefore, less paperwork was required.

The university community felt that the changes in the law were only partially responsible for these positive results. In the late '70s, paralleling the development of the new patent law, another major vector gave a push to the relationship between universities and industry. Due to an economic down-turn, the private sector began to look toward the university community as a less expensive source of fundamental research. Universities and industry had long been natural partners in the supply of scientists, but that relationship was expand-

ing. The universities had an expertise in the definition and solution of research problems. The private sector had a developing need for this expertise, as its own labs were becoming expensive appendages in a time of economic crises.

Concurrently, federal research funding began to level off in real dollars available for university research. As a result, the federal government began to promote university-industry interaction through such programs as the NSF University-Industry Cooperative Research Grants and Centers. The question then became:

HOW DO YOU DO RESEARCH WITH INDUSTRY?

This was a valid question because of the divergent cultures of the two would-be partners. Several issues, including a lack of shared objectives, complicated the relationship. Universities were interested in collaborations which led to long-term results, rather than short-term work for hire. Many faculty feared that their research would be co-opted or directed. Unlike industry, the university environment was an open one which provided access to numerous clientele, such as foreign students and visiting faculty. The universities' emphasis on publication further complicated the treatment of proprietary information and intellectual property.

In an NSF study concerning university/industry research*, interviews of industrial representatives revealed some rather interesting opinions. Those interviewed felt that: (1) in many industries, innovation usually occurs through in-house incremental improvement to existing products or processes rather than through an event that revolutionizes the industry; (2) universities play only a limited role in this process; (3) the challenge for industry is to determine the adequacy of the knowledge base and to identify emerging technologies and barriers to knowledge transfer; and (4) the primary role for universities is as educator and provider of talent.

The divergence in how universities and industry approached their relationship was well documented in the NSF study, University-Industry Research Relationships.[3] This study found that the factors which motivated industry were completely different from those factors which motivated universities. Industry was interested in access to students and professors, obtaining a window on science and technology, getting solutions to specific problems, making use of an economic resource, and being perceived as a "good citizen." Universities, on the other hand, were interested in obtaining access to new sources of funding,

less restrictive reporting relationships (as opposed to the federal government), student and faculty exposure to the real world, and gaining access to industrial research facilities. After comparing these divergent interests, it is not unexpected that most contacts between these two organizational structures were initiated by the university community.

Nevertheless, the new or expanded relationships manifested themselves in a host of interactions:

> consulting . . . industrial fellowships . . . NSF university/industry research . . . research contracts . . . liaison programs . . . seminars . . . short courses . . . patent marketing . . . facilities/equipment sharing . . . equipment use contracts . . . technology centers . . . visiting committees . . . limited R&S partnerships . . . Small Business Innovation Research (SBIR).

As these relationships progressed, the federal government attempted to become a catalyst through such programs as NSF University/ Industry Centers, NSF Engineering Research Centers, DOD University Research Institute, SBIR, and the Government-University-Industry Research Roundtable. The latter (Government-University-Industry Research Roundtable) developed a proposed model agreement for university/industry cooperative research. The effort did codify some generally accepted principles, e.g., publication, patent and data rights. But because these relationships tended to be both diverse and complex, it soon became apparent that, unlike Erma Bombeck's girdle, one size does not fit all.

To further complicate the issue, states began to form programs to partner universities and industry for the purposes of promoting economic development, enhancing job training and retention, and growing new companies. One example of the development of this phenomenon was the initiation of the Ben Franklin Advance Technology Program in Pennsylvania.

As if this were not enough of a matrix of potential participants and issues, in 1986 a new player entered the game-the federal labs. Laboratories became authorized to license the technologies they develop, to enter into cooperative R&D agreements with firms and universities, to reward inventors by sharing royalties with them, and to exchange personnel with industry. Congress also authorized the laboratories to handle their own technology transfer activities under the assumption that it was the most effective way to ensure real transfer.

Each federal laboratory was directed to create and fund an Office of Research and Technology Applications (ORTA) to manage their technology transfer activities. Personnel exchanges among industry,

academia, and the federal laboratories were also authorized. These provisions applied to both government-operated and contractor-operated laboratories.

After the Technology Transfer Act of 1986 was passed, then-President Reagan issued Executive Order 12591, which further emphasized the administration's commitment to the transfer of laboratory technologies. The order: (1) required the agencies to delegate the authority to enter into licensing and cooperative agreements to the government-operated laboratories (to the extent permitted by law), (2) emphasized that royalty-sharing and cash awards programs be implemented as soon as possible, (3) encouraged the exchange of scientific and engineering personnel between the laboratories and the private sector, and (4) encouraged cooperative research and development.

While the initial response of the laboratories was, in most cases, bureaucratic resistance and "stonewalling," it soon became apparent that the labs were going to be consolidated-first within agencies, and later among agencies. One of the key criteria used by USDOE in evaluating this process was a measure of the success of the labs in executing Cooperative Research and *Development* Agreements (CRADA) to transfer technology. The labs had become a third player in the university-industry mix.

During the years 1991 and 1992, a debate emerged around the topics of Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) initiatives, critical technologies, and a federal industrial policy. This debate was stimulated by the passing of the cold war, growing international competition and the loss of U.S. economic superiority in many fields, mounting federal deficits, and a creeping disillusionment with science and academic institutions.

In what were to be the waning days of the Bush Administration, critical technologies were itemized and a compromise RFP was issued by NSF to establish a Critical Technology Institute to work with the Congress. Simultaneously, a number of reports were issued which stressed linking research to national goals:

(1) The Office of Technology Assessments' 1991 Report, Federally Funded Research: Decision for a Decade;

(2) The House Committee on Science, Space and Technology's Report, Health of Research;

(3) The Carnegie Commission's Report, Enabling the Future: *Linking Science and Technology to Societal Gods;*

(4) The White House Office of Science and Technology Reports: Research Intensive Universities and The President's Council of Advisors for Science and Technology (PCAST); and,

(5) The Clinton Transition Plan, A Report on Science and Technology in the Clinton Administration: Recommendations for Transition Planning.

Since the transition planning document, the Clinton administration has published several position papers, the most recent of which, *Science in* the National Interest, places a special emphasis on applied research and partnerships, and would involve three players: Industry, Federal Labs, and Universities.

THE CURRENT QUESTION

While the old relationships of University-Industry research are still alive, it is clear that the main federal thrust has been, and in some form will continue to be, in the area of applied, or "strategic," research designed to expand our ability to compete in a global market. This concept, combined with projected flat funding (at best) for university basic research, now raises this question for university research administrators:

HOW DO UNIVERSITIES FIT AS A PARTNER IN THIS ENDEAVOR?

To answer this question, one should first look at one of the newer federal funding programs and examine its thrust. The Technology Reinvestment Project (TRP) is a good example. The TRP is designed to develop dual-use technology (the transferring of technology from the defense sector to the civilian commercial sector, or the transferring of civilian technology to a new product line with a former defense contractor) to promote regional technology alliances, and to enhance manufacturing education and training. While this program is currently being attacked as "corporate welfare," it will probably survive in a somewhat altered form.

The TRP program, and others like it, such as the defense program (D/P) conversion funds of the Department of Defense and the Department of Energy, have certain common expectations for the university participant: (1) understanding of, or experience in, the par-

titular dual use technology; (2) matching requirements; (3) experience in forming, or participating in, consortiums with industry; (4) intellectual property to be transferred; (5) training of impacted workers or upgrading existing skill levels; (6) assistance to small/medium-sized companies; (7) maintaining the military industrial base; and (8) lessening the impact of the downsizing of the defense industry.

The TRP is really part of a larger picture of the defense conversion of DOD and the reduction of the defense mission of DOE. Under Part 3161 of the 1994 Defense Appropriations Act, both DOD and DOE have been allocated relatively large amounts of funding to assist in lessening the economic impact of these downsizing efforts upon both the affected employees and the local communities. As a response to Part 3161 and other defense conversion opportunities, the Tampa Bay area formed the Defense Conversion Task Force. This group was primarily originated to assist in the conversion of the DOE Pinellas Plant (a nuclear weapons production facility) to civilian enterprise.

THE EXPERIENCE AT THE UNIVERSITY OF SOUTH FLORIDA

The primary players in the Defense Conversion Task Force were the plant contractor (Martin Marietta), the employees group, the business community, and the University of South Florida (USF)-collectively known as the stakeholders. Approximately $60,000,000 was pledged under Part 3161 to facilitate the conversion effort. Since the Defense Conversion Task Force [subsequently named the Community Reuse Organization (CRO)] had no infrastructure to handle these funds, for fiscal accountability the funds were eventually divided into three pots. The USF Research Foundation accepted the role of banker of $600,000, USF received a Cooperative Agreement for $20,750,000, and the balance was administered by the DOE Area Office on behalf of the CRO. The scenario which led to that arrangement would make a case study in and of itself; but, the purpose here is to look at the role of the research administrator in that effort.

At the very beginning of the discussion about conversion of the facility, the University was asked to be a significant partner, although no one was quite certain what that meant. As the Director of Sponsored Research, a member of the DOE Oak Ridge Associated Universities Board of Directors, and a former consultant to DOD, this research administrator was asked to represent the University. The first task was to determine the capabilities of the Pinellas plant.

Unfortunately, the Plant was a classified facility which was still '*behind the fence." This impediment also impacted the second task, which was to match the capabilities of the plant to those of USF and the local business community. The third task (and in some ways, the most difficult) was to find a way (or ways) of identifying the vested interests and the cultures involved and to blend them into a coherent group which could work together to convert the Plant. While the research administrator was by no means the sole force in this effort, more often than not, the University became the broker for the various interests and, in some cases, the mediator. Two and a half years later, the facility is well on its way to a successful conversion.

What were the factors that led to a successful participation by the University? The first and foremost was the ongoing involvement of the University in the local economic development of the region. It was not by accident that the business community and the local government leaders sought out the University as a partner. The University of South Florida is an urban institution of -36,000 students on five campuses. It is also one of the top 100 universities in research expenditures, as classified by the National Science Foundation. Therefore, the University had a prominent role in the community; but, more importantly, it had been an active member of the Tampa Bay economic development community. Because of this involvement, it was natural for the local business community to think of the University as a partner.

Secondly, because of its research standing and its faculty's involvement in the economic development of the community, the business leaders "sensed" that the necessary resources for assistance in the conversion were available at the University. And, a factor not unrelated to the first two, the University was there-only about 30 miles away on the interstate to the Tampa Campus and less than 10 miles from the St. Petersburg Campus. All of the necessary criteria, which were mentioned as common ingredients for defense conversion projects, were in place.

THE ROLE OF THE RESEARCH ADMINISTRATOR

This process suggests a different role for the campus research administrator. The research administrator who wishes to play in this game must become **scout, catalyst,** and **broker** of not only faculties' ideas, but also of their technology. To successfully engage in defense conversion, the university research administrator needs to have devel-

oped a network of industry contacts, and the university needs to have developed a level of sophistication in participating in consortiums with the business community and, preferably, the federal laboratories.

THE MODEL

The model involves **brokering** a marriage among defense related industries, federal laboratories, and the universities. Each of these potential partners brings a unique set of resources and needs to the table. The defense related industries have personnel, facilities, and equipment which can satisfy the matching requirements of most projects. The federal labs tend to have state-of-the-art equipment and skilled technical staffs. While the professional training level of the staffs at federal labs varies, from approximately 1% PhDs at the DOE Pinellas Plant (a weapons complex) to approximately 55% at Oak Ridge National Laboratory, the engineering technical staff in most labs is of high quality. Universities bring research faculty, graduate students, and an expertise in training. When these elements are combined around a technology, they offer a formidable package.

Partners need to be thoroughly scouted, because no matter how strong the consortium of partners appears, the relationship must still be one which is forged around a real commonality of interest. If the consortium is put together for the sole purpose of pursuing a funding opportunity, it will probably flounder and fall apart. The best example of this phenomenon was the first cycle of TRP awards. Many partnerships were hurriedly constructed so that the applicants could seek the TRP funding. Although most of the awardees were selected in February or March of 1994, over half of the cooperative agreements remained unsigned in late September, because the consortium members could not conclude their internal agreements. Those awardees who had pre-existing relationships were able to conclude their internal negotiations and sign the cooperative agreements with the lead federal agencies.

Another point to consider is who tends to be the lead player in the consortium. As pointed out in the Tampa Bay example, the University was in a good position to facilitate **(catalyst)** and mediate the formation of the consortium. Whether real or imagined, the university is generally seen as a more neutral or, in some cases, impartial partner; this may not really be the case, especially if the key technology comes from the university. If this is the situation, then all the more reason for the university to take the lead so that it has the maximum control of its faculty's intellectual property.

Although the optimum partnership would involve both a federal laboratory and the private sector, it may be useful to consider these interactions separately. 'When the university's primary partner is a federal laboratory, the partnership can be initiated through the CRADA process which allows the participants to develop a relationship around a project at little initial investment cost. Once the players and the project have been identified by the research administrator, a CRADA can be negotiated with the federal lab, which will allow the establishment of a feasibility project and the assessment of the availability of adequate resources to conduct the project. If the project has deficiencies, then additional partners can be added. These partners may well be private sector partners who have been identified during the performance of the CRADA.

If the university wishes to partner with the private sector, then the desired partner should be a small or medium-sized business which has been, or will be, impacted by defense downsizing. Most of these firms have little or no research capacity and are usually interested in the university's research and consulting expertise. As any research administrator who has worked with these kinds of companies knows, the companies usually have unrealistic expectations of costs and available resources at a university. The research administrator has an educational function in these relationships and, if they have a relationship with larger corporations, may sometimes become a broker for joint ventures between the small company and a larger partner. These tripartite ventures (university, small/medium-sized business, and larger private sector partner) can tax the imagination and patience of even the best research administrator. Those research administrators who have an established network with, or proximity to, a federal lab will also introduce the small/medium-sized business to the CRADA process and, thereby, complete the university/industry/federal laboratory partnership.

The end result of this brokering will be a partnership which can not only compete for strategic research funding, but which can "hit the street running" because the contractual elements of the relationship have already been negotiated, the roles of the players have been defined, and milestones have been established. This initial effort will help to prevent artificial "marriages of convenience" designed to obtain funding without carefully constructed teaming agreements.

CONCLUSION

The research administrator needs to become a scout who is skilled in identifying projects, a broker who will construct agree-

ments which lead to meaningful strategic research projects, and a catalyst who will facilitate the interaction toward agreed upon goals. The university, as a partner, is also better able to protect its technology interests and to make certain that the projects are related to its main academic mission.

Defense conversion projects are not for every university; but, if the key ingredients exist (dual-use technology, matching funds, experience in consortia1 projects with the private sector, and proximity to an impacted population), defense conversion projects allow the university to be a meaningful participant in economic development of the area and to open a whole new funding opportunity for the faculty.

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