RESEARCH MANAGEMENT REVIEW

The Journal of the
National Council of University Research Administrators

Concerned with the broad range of issues affecting the administration of research, Research Management Review provides a forum for the dissemination of knowledge about the study and practice of the profession of research administration. Research Management Review (ISSN1068-4867) is published semiannually by the National Council of University Research Administrators at One DuPont Circle, N.W., Suite 220, Washington, D.C. 20036.

NCURA's annual membership dues pays for the subscription to Research Management Review.

One-year subscription rate is $20. Orders for single copies must be accompanied with prepayment of $10.

Subscription requests and changes of address should be sent to Research Management Review, One DuPont Circle, N.W., Suite 220, Washington, D.C. 20036. Printed in the U.S.A.

RESEARCH MANAGEMENT REVIEW

The Journal of the
National Council of University Research Administrators

Volume 6 Number 1 Spring 1992

Editor's Preface

The theme of the 33rd Annual Meeting of NCURA was "The Chang ing Climate for Research". Two presentations made at that meeting are included in this issue of RMR. The first is the keynote address by the Honorable Rick Boucher. Representative Boucher, after presenting a brief overview of how the Federally supported research enterprise has developed and grown at colleges and universities, goes on to identify the current problems with the Federal research funding system as it exists today. These include issues such as more researchers than available funding can support, earmarking of an increasing portion of the research dollars, and public skepticism in the value of research and the integrity of the research process. In consort with the theme of the Annual Meeting, he calls for changes in accountability for research costs, increased R&D priority setting by the Executive Branch and Congress, and a reexamination of the nature of scholarship and the faculty reward system. The recent activities by OMB in proposing further revisions in A-2 1; and various reports such as those issued by the House Committee on Science, Space &Technology, chaired by Congressman Brown (D-CA); the Federal Coordinating Council on Science, Engineering and Technology (FCCSET) ; the President's Council of Advisors on Science and Technology (PCAST) ; and the review of agency objectives by the National Science Board Commission on the Future of the NSF al1 speak to the fulfillment of Representative Boucher's call for action.

Don Langenberg, in his presentation at the 33rd Annual Meeting, addressed another important rapidly changing field which has a profound impact on both the performance of and administration for research. In his address he examined the ongoing changes in information technology and reports on the recommendations of the Panel on Information Technology and the Conduct of Research of the National Academies' Committee on Science, Engineering and Public Policy (COSEPUP). From the needs identified by the COSEPUP Panel and the limited fiscal and human resources available, Chancellor Langenberg develops the concept of an "infory" manned by "inforians" as a possible way to meet the information needs of the research community.

The authors of our contributed articles follow the theme of "The Changing Climate for Research". Gerald Stahler and William Tash, through analyses of a survey document, attempt to identify the factors and the impediments to the growth of research at 30 universities selected as

institutions typifying the fastest growing research universities according to author established criteria. Basically, the greatest growth is found to occur at institutions where the administration has given research a high priority and developed practices that encourage a research environment; i.e., hiring more research-oriented faculty and rewarding success in obtaining sponsored research awards.

The article by Sharon Davis and James O'Hanlon addresses another aspect of "The Changing Climate" by examining the grant and contract activity in a subset of academic units; namely the Colleges and Schools of Education. Through the use of a survey document the authors attempt to characterize the grant and contract activity related to all types of sponsored projects. Again, the results of the survey indicate an increased expectation that the faculty of the Colleges and Schools of Education should be more active in pursuing sponsored project opportunities. The article emphasizes the opportunities for assistance to these faculty from the central research office.

One cannot help but compare the desired future directions for sponsored projects activities implied by the authors of these two contributed articles with the remarks of Representative Boucher and the findings of the various reports issuing from the government within the last few months of 1992.

The Changing Climate for Research: Keynote Address at the NCURA 33rd Annual Meeting

Honorable Rick Boucher (D-VA)

Editor's note: This *paper* was presented as the Keynote Address at the 33rd NCURA Annual *Meeting,* Washington, D.C., *November 4, 1991.*

The meeting theme, "The Changing Climate for Research," is particularly timely. There can be no doubt that the academic research climate is changing, and the preponderance of views is that the change is not for the better. An emerging crisis and a gathering malaise are frequently heard characterizations of the situation. These widespread perceptions may or may not be in proportion to the seriousness of the underlying problems. But the net effect on the research enterprise is severe in any case. A senior scientist who comes to believe, for whatever reason, that the situation is hopeless will not be persuasive in attracting bright young minds to careers in science.

It's tempting to suggest that the allocation of more money to research will solve the problem. Instead, increased funding would bring temporary relief to the fierce competition now occurring for research grants. But even a doubling of the federal research budget would be only an interim remedy and will not fundamentally alter the conditions that exist in the research community. Our inquiry should instead focus on root causes of today's discouragement.

Let's review briefly the growth pattern of the past thirty years. During the so called "golden age" between 1958 and 1968, annual funding for university-based research grew from under $2 billion to $7 billion in constant 1988 dollars. This growth was driven by the cold war competition, ballistic missile development, and the national goal of placing a man on the moon within the decade. Accompanying the increase in research activity was a major expansion of the research workforce. The number of

The Honorable Rick Boucher (D-VA) is a member of the U.S. Howe of Representatives and Chairman of the Science, Space and Technology Subcommittee on Science; 428 Cannon Howe office Building; Washington, D.C. 20515-4609.

science and engineering doctorates produced each year increased nearly threefold during the decade from a base of 6,300 in 1960 to nearly 18,000 in 1970. Clearly, during this period, research was propelled to the front rank of priorities on the campuses of the approximately 200 research universities in the nation.

That initial decade of growth leveled off between 1968 and 1978, during which period research expenditures in inflation-adjusted dollars stayed level and Ph.D. production held constant. Then during the 198Os, the second spurt of growth occurred. Between 1978 and 1988, research support nearly doubled in 1988 dollars, to the annual level of $13 billion. The academic research workforce continued to expand. During the decade, the number of science and engineering faculty indicating that research was a primary or secondary activity increased by 65 percent.

The growth of federal support for academic research over the past thirty years has greatly changed the culture within universities and has heightened expectations for the benefits we expect to flow from universities. Within universities, the growing size of the research function began to swamp other kinds of faculty scholarship. The faculty reward system began to place the greatest stress on success in obtaining research funding and in publishing research papers. Faculty size increased significantly, and the younger faculty, having been inculcated with the research model, naturally perpetuated it with their students. That is, each new Ph.D. expected to set up a laboratory and begin training new Ph.D.s to do research in the same mode as his mentor. The result is a situation today in which the total number of faculty with the preparation for and interest in research surpasses the capacity of the system to support them. No longer is there an assurance that a grant proposal for an obviously worthwhile project will receive funding. It must now compete with other admittedly meritorious proposals. As a consequence, while more projects than ever before are funded, there are also more good proposals than ever before that are not.

Another significant problem is the political skewing of federal research funds - particularly for bricks and mortar purposes. Increasingly, research universities are a critical component of regional economic development. Such universities are seen as a magnet for high technology industries and the new jobs which accompany them. Political and community leaders therefore press for increased federal support to upgrade the regional institutions. This, of course, fuels the interest in earmarks in appropriations bills for academic facilities. Earmarks are seen as necessary to upgrade the capabilities of emerging research institutions so that they are able to compete successfully for federal research funding with established research

universities. Good researchers laboring in less than adequate facilities in front rank institutions are understandably disgruntled when large sums are channelled elsewhere to accommodate less meritorious projects.

As if all of this were not enough, there is growing public skepticism about the value and direction of university based federally funded research. The foundation for the strong patronage for academic research by the federal government has been the connection in the public mind between support for research and resulting societal benefits. This support has been accompanied by a high level of trust on the part of the public and Congress that the academic research enterprise uses the resources made available wisely and well. An important aspect of the change in the academic research climate is an erosion of this trust.

Several factors have contributed to the public's view. As the competition for research funds has intensified, there has been a noticeable increase in the volume of complaints from scientists about the adequacy of federal support. These complaints come at a time of significant grcwth in federal R&D budgets and little or no growth in other federal discretionary funding. The net effect is to cast the academic research community in the light of just another special interest group anxious to preserve its entitlement program.

Coincident with this stronger advocacy for increased federal research funding have come well publicized events that tend to cast doubt on the integrity of the research process and on the adequacy of the universities' stewardship of federal research funds. I will not review the examples of scientific fraud which have been spotlighted by congressional hearings and the media, nor will I dwell on examples of scientists bypassing the normal peer review process and leaping into the media, such as the cold fusion debacle. Both kinds of events must erode public confidence in the probity and motives of scientists and of the scientific process.

In a similar vein, the unflattering publicity on indirect cost recovery by universities has weakened the fabric of support for academic research. The Science Subcommittee held two hearings in April of 1991 to examine the issue. At the hearings, we focused on the regulatory framework governing indirect costs. The framework was borrowed from defense procurement policy many years ago and does not adequately reflect the unique nature of the federal investment in university-based research. Over the years, the regulations have become Byzantine in their complexity. They have fostered a system which does not benefit either universities or the federal government. Compliance is expensive and difficult for universities and oversight is difficult and cumbersome for federal agencies. Indeed, it is a system that invites abuse. During the course of our hearings, it became

clear to me that the system does not function as intended. What is needed is substantive reforms, not minor tinkering. OMB's recently published regulations are a step in the right direction, but more must be accomplished. The system, if it is to work to everyone's advantage must be simple, transparent, and fair.

I believe that the key reform is a uniform system of accounting for all research costs, Every university should account for direct and indirect costs and for the various cost pools within the indirect category using a uniform system. Until this is done, it will be impossible to understand trends in indirect cost growth and to devise policies to insure balance between direct and indirect costs.

Some additional positive actions could improve the academic research climate. An essential step that must be taken is to improve the process for allocation of resources among worthy science and technology projects. Some priorities must be established. We now face an embarrassment of riches, far more research opportunities than we can afford to fund. That is truly a sign of strength in the system. No one would prefer the reverse situation. But it presents a challenge in deciding which R&D activities are most timely and most important, and which may be deferred. The way such choices are made among all Federal discretionary programs is through the political process, which must factor in all of the other demands on the federal government's resources. Within the R&D budget, scientists and engineers can provide much helpful guidance, especially in setting priorities within particular fields.

A good example is provided by the astronomy research community. Astronomers perform a comprehensive evaluation of proposed ground and space-based research facilities each decade. The result of this process is published in a report which lists specific projects and estimated costs in order of priority. Federal agencies often base funding decisions for astronomy on these consensus agreements reached by the affected research community.

Active involvement by scientists and engineers in the process of allocating R&D resources is desirable. Growing involvement does not mean that scientists will make the final choices, as was made clear by the recent funding decision on NASA's space station. But, by offering expert views on the scientific merit and technical feasibility of R&D projects, the scientific community can help insure that informed decisions are made, even though other criteria may be the deciding factors in particular cases.

The Executive Branch and Congress must also do a better job in setting R&D priorities. The Congress, with its fragmented and overlapping jurisdictions for R&D programs, has been to date institutionally unable to sort out priorities from among the platter of choices presented in the budget

requests. That must change. Choices must be made between spending for mega science projects and small research projects because unfettered spending for the former necessarily adversely affects funding for the latter. Within the categories of big and little science projects, some ranking must occur. That goal is easy to state and difficult to meet. But it is the intent of our Science Subcommittee to begin the process of establishing a collaborative framework involving all of the Committees and Subcommittees having R&D authorizing jurisdiction.

Another fundamental issue associated with improvement of the academic research climate is largely in the hands of the universities themselves. That is, a reexamination of the nature of scholarship in universities. Recently, the Carnegie Foundation for the Advancement of Teaching has criticized as being too narrow the prevalent definition of scholarship, which is research followed by publication. In a report entitled, "Scholarship Reconsidered: Priorities of the Professoriate," the Carnegie Foundation advocated that higher education should encompass four types of scholarship: research, integration of knowledge, application of knowledge, and teaching.

General acceptance of this expanded view of what should constitute the legitimate activities of faculty would in turn lead to a different faculty reward system. Recognition that research is not the only important function of faculty would have beneficial effects on both research and teaching. Competition for research funding would be lessened since research performance would not be the predominant faculty evaluation criterion and since faculty interests would likely encompass other kinds of scholarship. In particular, faculty who are drawn to academic careers by interests in and aptitude for teaching would be able to address serious problems in science education. Lasting reforms in undergraduate instruction in science, math, and engineering will require dedicated professors who can devote the time and intellectual effort needed without fear of penalizing their careers.

The importance of the academic research enterprise to the continued prosperity and security of the nation is not in doubt. A magnificent capability has been built up over the past thirty years. Although change and some reform are needed, the basic strengths of the system must be preserved and the enterprise reinvigorated. Root problems must be addressed and resources allocated so as to ensure that the human resource base in science and technology is renewed and that the new discoveries which drive economic growth and ensure the quality of life of our citizens are pursued. It is in the interests of both the public and private sectors to ensure that policies are identified and implemented to reach these goals.

Ours to Tame:
The Information Frontier

Chancellor Donald N. Langenberg
The University of Maryland System

Editor's note: This paper was presented as the Plenary Session Address at the 33rd NCURA Annual Meeting, Washington, D.C., November 5,1991.

Good morning! It's a pleasure to join you this morning. In the last three or four years, scientists have come to regard the storage, organization, management, and utilization of information as one of their most frustrating problems. John Naisbitt reports that some of our colleagues claim it takes less time to do an experiment than to find out whether or not it has already been done. He might be exaggerating; but only slightly. I know we all share the hope that someday, someday soon, we will be able to utilize the information we continue to amass.

Let's consider the approximate dimensions of our information problem. The Library of Congress contains about 10 terabytes of information, collected over two centuries. Put another way, the library's collections contain nearly 100 million items that occupy 532 miles of shelving. Medical imaging machines produce that much information every week or so. The particle detectors of the Superconducting Super Collider will one day bury their designers in that much information every few seconds. NASA already has 1.2 million magnetic tapes containing data from past missions, and this is growing by 63 terabits of information annually. In 10 years, it will have grown to 4,200 terabits a year - the equivalent of 53 new Libraries of Congress a year.

Why the avalanche of information? As we scientists develop more sophisticated questions and better instrumentation, we increase our ability to collect data. If advancement of knowledge is going to keep pace with our ability to accumulate data, we will need better ways of organizing, managing, and accessing information. Information technology has taken on a sense of urgency. It is, in effect, the newest frontier. This realization

Donald N. Langenberg is Chancellor of the University of Maryland System, Adelphi, MD 20783

has led some representative users to engage in serious dialogs aimed at making data more accessible and more usable.

Let me begin by describing a bit about my growing interest in information technology. First, let me say that I am not an information scientist. I did spend much of my professional life as an experimental physicist, but I fell from grace by becoming an administrator. That happened long enough ago that my claim even to the title "scientist" is now somewhat suspect. Whatever grounds I may have for presuming to address this subject this morning rest on two things: First, both as a scientist and as a university administrator, I believe that the current breathtaking rate of change in information technology will inevitably force historic changes in our institutions for managing information. Nowhere is this more evident than in the research and education communities which both create important new developments in information technology and are often bellwethers in its use. It is from the viewpoint of these communities that I speak this morning.

Second, several years ago I chaired a panel of the National Academies' Committee on Science, Engineering, and Public Policy (COSEPUP) . The Panel on Information Technology and the Conduct of Research was charged to examine information technology and its present and potential future uses in the conduct of research. My work with the panel gave me a marvelous education in its topic. Although the Panel was concerned only with the uses of information technology in research, I believe many of its findings and recommendations also bear on its uses in government, business, and industry. I wouId therefore like to share them with you this morning.

The title of the Panel's report is Information *Technology and the* Conduct of *Research: The User's View*. *(You* might have noticed the similarity between the title of the Panel report and that of my presentation this morning. I assure you that the similarity is not purely coincidental.) The word "users" in that subtitle reflects one of the Panel's most salient findings. If I may paraphrase it, it is that the diffusion of the benefits of information technology throughout the research community is far too important to be left to the experts. That is to say, the primary policy guidance for the exploitation of the potential of information technology should come not from information specialists, information scientists, information technologists, or local, national, and international policy makers but from users both current and prospective. It may not invariably be true that "the customer is always right," but institutions that create technology or make policy without a clear understanding and appreciation of the real needs of their clients and constituents risk making serious and expensive blunders.

The Panel found that "information technology has already had a significant and widespread impact on the conduct of research. For the future, that impact amounts to a revolution." Given these enormous quantities of information, our panel further found that "significant impediments to the widespread use of information technology in research require careful attention. Some impediments are technical and financial. Other impediments, which up to now have received the least attention, are behavioral and institutional."

"Technical impediments are serious in a few fields. Fields doing large-scale experiments, using satellites to gather data, and using graphics to analyze large amounts of data will for the foreseeable future need computers, software, and networks that are bigger, faster, more capable, and more efficient." The gap between what is needed and what is available is several orders of magnitude wide for some fields, but we can expect continuing advances in information technology which will narrow or close these technological gaps.

"Financial impediments are chronic. Despite the decreasing cost of hardware, no sources will ever supply enough money to provide every researcher the best information technology environment. The institutions that fund researchers will continue to do their best, and information technology will continue to need more funding." Unfortunately, not enough dollars are available to fund academic research adequately. And a serious shortage of scientists and engineers looms just over the horizon. One of our challenges, then, is to maximize the use of our resources, both fiscal and human, by efficiently using information.

The Panel concluded that the infrastructural impediments, i.e., the behavioral and institutional impediments, may well be more serious than the technical and financial impediments. The Panel sorted them into the following four major categories:

- problems of access,
- problems with learning and use,
- problems of the attitudes of individual researchers, and
- problems of managing information technology,

The Panel made three recommendations. They were:

"I. The institutions supporting the nation's researchers must recognize and meet their responsibilities to develop and support policies, services, and standards that help researchers use information technology more widely and productively. Specifically, we recommend that:

- Universities provide accessible, expert help in learning and using information technology.

- University departments and scientific and professional groups establish career ladders for scientific programming positions.
- Funding agencies provide support for scientific programming and for help services in learning and using information technology systems for research.
- Scientific associations establish disciplinary standards for the storage and indexing of scientific data.
- University departments and scientific and professional groups implement mechanisms for the evaluation, merit (peer) review, and dissemination of software useful in the conduct of research.
- Vendors, in collaboration with scientific groups, establish standards for simplified and consistent user-machine interfaces.
- Network administrators provide simple user interfaces and addressing schemes, add gateways to other networks, improve system reliability and capacity, and provide on-line help, such as guides to services and mail addresses of individuals who can answer questions.
- Information service providers create simplified common standards for accessing and querying information sources, and eventually provide unified access to information.
- Software vendors, and scientific and professional groups create program libraries and make them accessible through the networks."

"II. The institutions supporting the nation's researchers, led by the federal government, should develop an interconnected national information technology network for use by all qualified researchers. Specifically, we recommend that:

- The Office of Science and Technology Policy (OSTP) in the Executive Office of the President and the federal agencies responsible for supporting and performing research and development plan and fund a nationwide infrastructure for computer-based research communication.
- Planning and development of this nationwide infrastructure be guided by users of information technology in research, rather than by technical experts in information technology or hardware or software vendors. The Panel believes strongly that such a national network is too important to the future of research to be left only to the technical experts.
- The national research network be founded on the fundamental premise of open access to all qualified researchers/scholars that has nurtured the world's scientific community for centuries.
- The national research network be developed in an evolutionary manner, making full use of the existing successful networks for research."

"III. To facilitate implementation of Recommendations I and II, and to focus continuing attention on the opportunities and impediments associated with research uses of information technology, the Panel recommends the establishment at a national level of a user's group to oversee and advise on the evolution and use of information technology in support of scientific, engineering, and clinical research."

None of you would believe me if I told you that all of these recommendations had already been addressed and implemented by someone. They haven't, but there are some encouraging signs to report. Progress has been made within and across disciplinary fields. Let me cite a few examples.

- Scientists in space and earth science have set forth data requirements.
- The Numerical Data Advisory Board has produced studies that look at data validation needs in the physical and chemical sciences.
- A study is being developed that will explore the statistical methodologies involved in combining statistical data from diverse sources.
- A committee of the Institute of Medicine is examining ways of creating a national neuroscience data base.
- Other national panels and committees are studying access, confidentiality of electronic data bases, computer security, and the use of information technologies to promote standards of scientific conduct.

Users are tackling the problems that our Panel described. Our success in some areas has led to more problems. Consider the human genome project. In August, many of the world's leading geneticists gathered in London for a conference. During the conference, 700 scientists added data on 600 newly discovered genes. The Wall Street Journal reported that the sheer volume of new data was the outstanding feature of the meeting. Conference organizers required a book of 350 pages to publish the abstracts of the scientific papers read at the meeting. To date, only 2,500 of the 50,000 to 100,000 human genes have been mapped, fifty percent of those within the last two years. The rapid growth in gene mapping has made current data collection and distribution methods outdated. Scientific journals cannot handle the volume of new discoveries in a timely way. Robert Sparkes, a UCLA geneticist, told the genome conference participants that one of the biggest challenges will be to get the enormous amounts of data to scientific researchers. One way of doing that would be for scientists to enter their discoveries directly into the Genome Data Base. That would enable scientists from all over the world to monitor progress through the data base. Unfortunately the computer links that would make possible such access do not yet exist.

On a national scale, very encouraging progress is being made. The Senate and the House have passed a bill that would establish a National Research and Education Network (NREN). As proposed, NREN would

dramatically expand and enhance the U.S. portion of Internet. A substantial part of the domestic Internet is now loosely coordinated by several federal agencies, including NSE The proposed NREN will provide network access to research and educational institutions at all levels and locations. Also, it will provide the high speed technology needed to support access to digital libraries and large scale distributed computing resources. NREN will handle the performance of computationally intensive applications requiring real time visualization of modeling and simulation results, rapid interrogation and retrieval of scientific data from specialized data bases, remote control of experiments and simulations, and teleconferencing. Although administrative details need to be worked out, I think the NREN stands a good chance of being approved by Congress and the President. Its approval puts us a giant step closer to a national computer network that is essential for communication between scientists.

Given the nontrivial information technology needs outlined by the COSEPUP Panel and limited fiscal and human resources, what should be our highest development priorities for information technology? Aside from a national high speed electronic network and the equipment needed to make it work, I would put a few other items on the high priority list:

- Integration of data bases from diverse sources.
- Development of transparent access to electronic data by all researchers, first within a field and then across fields. This will require improved communication and cooperation between researchers and those who design information systems.
- Archiving very large data bases. This will require decisions on what to retain, where to store it, what formats to use, and how it can be accessed several decades from now so that its retrieval is not dependent on specific obsolete hardware and software. A wise archiving policy is essential if we are to utilize any of the vast amounts of data being collected.

In a way, the priorities I've listed give way to what I have elsewhere called "infories," served by "inforians." An infory might refer to a physical place, a collection of information, artifacts, or the workplace of a group of professional information technologists. It is not intended to suggest a computerized library. Unlike libraries, infories will not be localized in rooms and buildings, storing and circulating information in the form of books and documents. Modern research has outgrown that model because of both the speed and the volume of its progress. Infories will be highly delocalized, will store information magnetically and optically, and will disseminate it at the speed of light across global networks,

The primary function of an infory is the provision of service in support of research. Some information resources might be housed by the infory itself. Much information will be based elsewhere and accessed electronically via networks. Infories will provide the capability by which researchers can send to and receive from other researchers communications ranging from simple personal messages to the high speed transmission of huge amounts of data.

The second function of an infory is that of nurturing a profession of information technologists. There is clearly a need for creative, innovative people to dedicate their careers to serving researchers' needs for information resources, especially specialized software. An infory could provide the attractive professional environment in which such people could work.

The third function of an infory is the dissemination of software useful to researchers. An infory ought to contribute to a national and international capability for developing and imposing standards and for evaluating and certifying software for researchers. The analogs are to be found in the peer review systems used by the scholarly community, particularly universities in appointing faculty and granting tenure, and by federal agencies and foundations in reaching decisions on proposals. No comparable system of judging software now exists.

Infories will probably evolve gradually from existing institutions; from libraries, from data repositories, from commercial information enterprises. So long as we can avoid a trap of thinking only in traditional terms founded on traditional assumptions, terminology won't matter. Any kind of organization which has as part of its mission supporting the information needs of researchers or which itself employs researchers must provide some of the services of an infory. Each would function as a node in a broadly interconnected network of information resources designed to sup port the global researcher.

We will need to seek new funds for infories, but, for the most part, we will probably begin by using resources already committed to existing information support systems. We are already investing substantial portions of our available revenues for this purpose.

Policy rather than technical questions pose perhaps the most difficult problems we face. The ways in which we handle intellectual property rights will almost certainly change radically as we move further into the electronic age. Questions of effective data validation and peer review are among the first issues raised by those who are considering electronic journals or any formal exchange of electronic data among a community of scholars. With the growth of computer networks and increased ease of

access to data bases, insurance of data security and privacy protection become issues that compete with the other priorities I've listed.

When he wandered through the Maine woods in the mid-19th century, Henry David Thoreau could never have envisioned the issues facing the modern researcher. He wisely observed, however, that "the frontiers are not east or west, north or south, but wherever a man fronts a fact." Today, the frontiers involve the issues of information technology. Life on the information frontier is every bit as daunting as it was on the frontier that we think of as the Old West. The principal difference is that this newest frontier is ours to tame.

Thank you.

Success in External Funding at the Fastest Growing Research Universities: Contributory Factors and Impediments

Gerald J. Stahler and William R. Tash

Abstract. The purpose of this exploratory study was to attempt to identify the factors responsible for the success in obtaining rapid increases in external research support of the fastest growing research universities as well as to identify major impediments to their further growth. A survey questionnaire was sent to the chief research administrators at 30 of the fastest growing research universities, and a return rate of 60% was achieved. The findings suggest that the most important factors for rapid growth in research funding were having Presidents, Provosts, Deans, and Department Chairpersons setting research as a high priority; implementing policies which are conducive to fostering research expansion such as liberal faculty release time for research and using funded research performance as a criterion for promotion and tenure; increasing the number of new faculty hired in selected fields; and expanding research space, facilities, equipment, and start-up packages for new faculty. The major impediments to further growth included a lack of research space, equipment, and facilities; lack of state support for research; limited numbers of new faculty hires; and decreases in university funds for research.

INTRODUCTION

Between 1969 and 1990, the amount of federal funding that universities received for research increased from **$4** billion to nearly $8 billion in constant 1990 dollars'. The distribution of these funds was largely concentrated among 100 research universities which, in 1988, received 85% of the total federal research dollars to universities. In fact, 50% of the total funding was concentrated among only 30 of these universities'.

Over the years, there has been some shifting among research universities in terms of their relative rankings in sponsored research. Some

Gerald Stahler is a faculty member in the Department of Geography and Urban Studies and former Associate Vice Provost for Research at Temple University. William Tash is Vice Provost for Research and Professor of Sociology at Temple University, Philadelphia, PA 19122.

universities have moved aggressively forward in this arena while other universities have had relatively stagnant research programs or even declined in their level of external funding. A number of studies have attempted to explain success in obtaining funding by identifying correlates of external support. Harris?, for example, distinguished among studies that examined external support using individual, institutional, and individual-plus-institutional variables. Individual variables are those that appear to be associated with an individual investigator's success in obtaining grants, such as past experience in writing proposals and experience with externally-support research as a graduate student[3].

Institutional variables such as the existence of grants administration offices", the amount of internal grant funding available", ratings of the quality of graduate programs and prior federal funding levels[5,6] financial and staff resources of sponsored projects offices[7], and number and/or quality of publications[8,9] have been shown to be correlated with an institution's external support. While there has been some empirical study of this area, there has been an even more abundant literature of case studies and prescriptive discussions on how to enhance research funding at universities[10~15].

Most studies and discussions of "success" in external funding have used volume of grant funding, number of awards, or the number of proposals submitted. Only a few writers have specifically examined growth in sponsored research[15]. While identifying institutional variables that correlate with funding success can be of some interest, it can also lead to such findings as the best predictors of grant funding in one year is the amount of grant funding received during a prior year[4]. This offers little insight into the factors which are responsible for an institution's funding success.

If we are to better understand what factors are responsible for external funding success, then a more useful way of looking at level of research funding is not to examine it as a static concept. Rather, it may be more fruitful to: (1) examine growth or change in research support as the important dependent variable instead of number of dollars awarded to an institution in any given year; and (2) to query research administrators, at those institutions which have grown the fastest, about the reasons for this growth.

The purpose of this exploratory study was to solicit information from the chief research administrators at the fastest growing research universities to better understand what factors were responsible for their increased success in obtaining external research support and to identify the major impediments to their further success.

METHODOLOGY

Sample Selection

Data were obtained from the National Science Foundation's annual survey of scientific and engineering R&D expenditures at universities and colleges. Research expenditures are reported to NSF for all disciplines in the sciences, engineering, and social sciences. Universities were ranked according to the amount of total R&D expenditures in N 1990. The rankings of the top 150 universities in 1990 were compared to their rankings in 1983. For sampling purposes, the 150 universities were stratified into three groups - universities ranked l-50; 51-100; 101-150 - since we wanted to sample various sizes of research programs among these research universities.

A purposive sample was selected of the five universities in each group that had the greatest increases in rankings between 1983 and 1990. The sample was augmented by selecting the five universities which had experienced the largest absolute increases in total funding levels. This was necessary since even within each stratum, the change in rankings is greatly influenced by the institution's position within that 50 school category. In general, the greatest increases in rankings came from universities in the bottom of the stratum. This is to be expected because the lower the ranking, the smaller the increase in funding necessary to improve one's ranking. For example, one university in the top ten moved up one ranking with an increase in funding of $118 million, whereas another institution toward the bottom of the very same stratum increased its ranking 37 places with an increase in funding which was nearly $40 million less.

Thus, the final sample was comprised of 10 universities in each stratum that were judged to have made the greatest increases in funding between 1983 and 1990. Five were universities with the greatest increases in rankings, and five were universities with the greatest increases in absolute dollars. Combined, these universities comprised our sample of 30 of the fastest growing research universities in terms of external funding.

Questionnaire Design

The intent of the questionnaire was to solicit information from senior research administrators about how their universities expanded their external funding so rapidly during the 1980s. While the questionnaire collected data pertaining to a number of information domains that were part of a larger study[16], the major items of interest used for the present study were two series of questions. Respondents were first asked "In your opinion,

which factors contributed most to stimulating increases in external research awards in your institution between 1983 and 1990. We are particularly interested in those factors that were responsible for the major changes in your institution's external research support; not the activities/policies that you would like to see but have not implemented." This was followed by 17 items which were to be rated on a one to four scale, with "1" being "very important" and "4" being "not important." These factors were developed based on the purpose of the study, the prior research literature, the investigators' personal knowledge and experience in the research enterprise, and a qualitative analysis of activities undertaken in several universities in Philadelphia area. A listing of the items appears in Table 1.

The second question posed concerned the impediments to further growth. This question asked, "Please rate the importance of the following institutional factors in impeding external research support at your university." This was followed by 16 items which are listed in Table 2. In addition, these fixed choice questions were combined with several open-ended questions pertaining to the same questions to obtain information on any other factors that were not included on our questionnaire.

The questionnaire was pretested on research administrators from several neighboring research universities and was revised accordingly. Revisions included improvements in clarity and format, modifying response choices, and adding additional factors which were relevant to the domains of interest.

Procedure

Questionnaires were sent to the chief research representative at the identified universities. A follow-up letter was sent to all non-respondents to the first wave of questionnaires. A total response rate of 60% (18 out 30) was achieved. The actual respondent varied in terms of administrative position, ranging from Associate Dean for Research to Director of Sponsored Programs to Vice President for Research.

RESULTS

Factors Related to Research Productivity

Those factors rated as most important in stimulating research during the 1980s at the fastest growing research universities are listed in Table 1. The most important factor cited was deans and department chairs setting research as a high priority, which was rated as "important" or "very

TABLE 1.

FACTORS JUDGED "IMPORTANT" OR "VERY IMPORTANT" IN STIMULATLNG RESEARCH

More Important Factors (>50%)	Percentage of Respondents Rating Factors As "Important/Very Important" n=18
1. Deans and chairs setting research as high priority	89%
2. Increases in number of new faculty in specific fields	83%
3. New space and facilities available for researchers	83%
4. Research performance as criteria for promotion, tenure, and salary increases	83%
5. President/Provost setting research as a high priority	78%
6. Increases in proportion of faculty submitting proposals	12%
7. Equipment and start-up packages for faculty	72%
8. Faculty release time policy for research	65%
9. High retention rate of existing faculty	59%
10. Overhead return incentives	53%
Less Important Factors (<50%)	
11. Major increases in university funds to support research	47%
12. Abundant matching funds and cost sharing	47%
13. State support for research	41%
14. Increases of research assistants/postdocs	31%
15. Research &Development tax credit	22%
16. Administrative restructuring	19%
17. Federal lobbying efforts	12%

important" by 89% of our sample. Increases in new faculty hires in specific fields; new space and facilities available for researchers; and research performance as criteria for promotion, tenure, and salary increases followed closely behind (83%) in terms of importance. Setting research as a priority by the President and Provost was judged to be nearly as important as the above factors, particularly by non-medical center institutions, since there is a tendency for medical center institutions to place a greater emphasis on the medical school's dean's commitment. Several respondents elaborated upon these factors referencing the aggressive leadership from high level administration and specifically the President, or support from the Vice President for Research. There was also a cross cutting theme that research policy at most of these universities appeared to be tar~ geted, centralized, and focused on interdisciplinary centers and institutes. That is, research growth was particularly sparked by concentrating

resources in targeted areas, and particularly in centers and institutes, as opposed to trying to expand in all areas at one time.

Other factors rated as "important" or "very important" by more than half the sample included increases in the proportion of faculty submitting proposals, equipment and start-up packages for faculty, faculty release time policies for research, high retention rate of existing faculty, and overhead return incentives.

The remaining factors that were of less importance with fewer than 50% deeming them as "important" or "very important" in accounting for research growth include the following (in decreasing importance) : major increases in university funds to support research, abundant matching funds and cost sharing, state support for research, increases of research assistants/postdocs, Research & Development tax credit, administrative restructuring, and federal lobbying efforts.

Factors Impeding Research Productivity

Those factors that were judged to be the greatest impediments to external research support are listed in Table 2. The factor receiving the highest proportion of "important/very important" responses was inadequate space and facilities (76%). This was closely followed by insufficient equipment/start-up packages for researchers (65%). These two factors may be indicative of problems that universities face as they rapidly expand their research programs. Their volume of new research may create stresses in their ability to meet the space and equipment demands of research expansion. Equally important impediments were insufficient state support for research and the limited number of new faculty hires, both of which were judged to be important impediments to further research growth by approximately two thirds of our sample. Finally, even at the fastest growing research universities, a lack of internal funds to support research efforts is perceived to be a major impediment, with more than half the universities in our sample judging this item as important.

Factors which were of somewhat less importance in terms of impeding external research funding, judged to be "important" or "very important" by less than half of the respondents, were the following: a lack of university funds for matching and cost sharing purposes, increased teaching loads, competing demands of undergraduate teaching, greater clinical demands on faculty, absence of overhead incentive returns for faculty (most of the universities already had such a policy, although several had added such a policy during the late 198Os), inadequate release time policy for faculty research, decrease in research assistants/postdocs, poor retention rate of faculty, absence of President/Provost support for

research, detrimental restructuring of research, and absence of federal level lobbying efforts for research. The interpretation for why less than half of our sample rated most of these factors as important impediments, which is largely borne out by their responses to other items, is that either these universities have handled many of these potential impediments in a way that largely eliminates them as problems for their research programs, or, as in the case with federal lobbying efforts, they are not perceived as necessary for their research programs to prosper.

TABLE 2.

FACTORS JUDGED "IMPORTANT" OR "VERY IMPORTANT" IN IMPENDING RESEARCH

More Important Factors (>50%)	Percentage of Respondents Rating Factors As "Important/Very Important', n= 17
1. Inadequate space and facilities	76%
2. Insufficient equipment/startup package for researchers	65%
3. Insufficient state support for research	65%
4. Limited number of new faculty hires	65%
5. Decrease in university funds for research	56%
Less Important Factors (<5O%)	
6. Lack of matching funds/cost sharing	41%
7. Increased teaching loads	41%
8. Competing demands of undergraduate teaching	35%
9. Greater clinical demands on faculty	33%
10. Absence of overhead incentive returns for faculty	31%
11. Inadequate release time policy for faculty research	29%
12. Decrease in research assistants/postdocs	24%
13. Poor retention rate of faculty	18%
14. Absence of President/Provost support for research	18%
15. Detrimental restructuring of research	13%
16. Absence of federal level lobbying efforts for research	6%

Two respondents added comments concerning the impediments to research productivity. Of particular importance to one of the respondents is the over-regulation at the state and federal levels. Another respondent mentioned that after a rapid increase in state funding which resulted in the expansion of research in several targeted areas, recent reductions in these funds are hurting the capabilities in those areas. Thus, limits on

state funding for research, which was rated as a strong factor by most respondents, seemed to have been especially problematic to this respondent's university

DISCUSSION

The primary objective of this exploratory study was to attempt to identify the mechanisms or factors responsible for the rapid growth of the fastest growing research universities in terms of external funding. Examining funding success from the perspective of research growth, instead of static volume, provides us with more useful information concerning how universities can move their sponsored programs forward. Just because a research university has a large sponsored research program does not mean, by our definition, that it is necessarily a successful program. It is possible that it can be in a period of relative stagnation or even decline in terms of external funding. If one is interested in enhancing one's own institutional ability to attract external funding, then the lessons learned from the fastest growing research universities may be far more useful than those from large research universities that have not grown in recent years. In addition, we assume that the chief research administrators at these universities make the best informants since we presume that they are the most knowledgeable about the dynamics affecting their institution's overall research program.

The results of this study, however, must be considered preliminary and of heuristic value which invites further investigation because of the relatively small sample size, and the limitations involved in using survey methodology which can mask the unique characteristics of institutions. Nevertheless, the results of this study suggest a number of implications for universities that wish to move forward in terms of their sponsored research programs.

According to our respondents, what seems to have propelled the rapid growth of these universities, might be distilled into three broad, interrelated categories:

1) commitment by university administrators to setting research as a high priority;
2) the promulgation of policies by these administrators that encourage and promote research;
3) providing the resources and infrastructure necessary to carry out research.

Each of these thrusts is linked to the others, and all three are most likely necessary ingredients for a research university to successfully move

forward. The commitment of deans and department chairpersons toward setting research as a priority, as well as the support of the President and Provost, results in policy formulation that encourages research and promotes a positive research climate, or research "culture,"[15] within the institution. These administrators then ensure the viability of research productivity by providing the resources necessary to carry out policies that support research. Such policies as research performance as a criterion for promotion, tenure, and salary increases; faculty release time for research; and indirect cost returns were judged to be major factors for increased sponsored research levels.

Perhaps even more important is the enhancement of the resources and infrastructure necessary for conducting research. The increase in new faculty hires in targeted fields, the provision of adequate research space and facilities, and the supplying of adequate equipment and start-up packages were viewed as key factors in rapid growth. Ironically, the respondents also believed that while these resources were instrumental in achieving major increases in external funding during the 198Os, these same factors were also deemed to be among the biggest impediments to further growth in external funding. There is the implication that with more new hires, equipment, space, and facilities, these universities could have expanded even further their ability to attract external research funding.

It also appears that most of our sample, although not all, experienced their rapid expansions without substantial increases in state support, and that the lack of state support was seen as a major impediment for research. Considering that non-federal sources provided most of the funds for capital expenditures at universities - as much as 92% in 1987 compared to 81% in 1980[17] - the lack of state support for the research infrastructure may be of great importance even to these successful research universities. On the other hand, such factors as institutional restructuring which Mishler[12] has suggested to be important at a mid-size research university, R&D tax credits (frequently cited by research organizations as important), and federal lobbying for Congressional set-aside funding were not seen as very important factors either as an aid or impediment to research growth.

In conclusion, while there are many activities discussed in the literature for enhancing an institution's external funding levels, our study suggests that the universities that had the most rapid growth in research funding, had Presidents, Provosts, Deans, and Department Chairpersons setting research as a high priority. They consequently implemented policies which were conducive to fostering research expansion, such as increasing the hiring of research faculty in fundable fields, reinvesting indirect cost

recovery funds into the research program, providing adequate release time for conducting research, and supplying expanded research space, facilities, equipment, and start-up packages for university researchers. Finally, these resources were concentrated in selected departments, institutes, and centers that could take advantage of external sources of research support.

REFERENCES

1 Federally Funded Research: Decisions for a Decade, Office of Technology Assessment, Congress of the United States, OA-SET-490 (Washington, D.C.: GPO, 1991).

2 Harris, K., "Factors Associated with External Funding in Higher Education: A Review of Research," Society of Research Administrators (SRA) *Journal, XV:* (1984): 39-47.

[3] Harris, K., "Effect of Prior Experience on Decision to Submit Proposals," Society of Research Administrators (SRA) Journal, XVI, (1985) : 29-35.

4 Muffo, J.A., and Coccari, R.L., "Predictors of Outside Funding for Research Among AASCU Institutions," Research in Higher Education, 16, (1982): 71-80.

[5] Wolfle, D., "Predictors of Outside Funding for Research Among AASCU Institutions: A Reanalysis," Research *in* Higher Education, I7, (1982): 99-104.

[6] Nozicka, G., "Federally Funded Research and Development at Universities and Colleges, a Distributional Analysis," NTIS No. PB 294008AS (Washington, D.C.: Moshman Associates, 1978).

7 Bergen, D., "Relationship of Effort to Success in Gaining Federal Funding at a Group of AASCU Institutions," Society of Research Administrators (SRA) Journal, XXIII, (1990): 15-23.

[8] McAllister, P.R., and D.A. Wagner, "Relationship Between R&D Expenditures and Publication Output for U.S. Colleges and Universities," Research in Higher Education, I 3, (198 1) : 3-30.

[9] Neumann, Y., "Predictors of Funding in Academic Fields," Research in Higher Education, 9, (1978): 115122.

[lo] Creswell, J.W, "Faculty Research Performance" (Washington, D.C.: Association for the Study of Higher Education, 1985).

[11] Donaldson, C., "Developing a Successful Sponsored Research Program at a 'Teaching' College," Society of Research Administrators (SR4) Journal, XXIII, (1991): 35-40.

[l2] Mishler, J.M., "Enhancing the Prospects for Acquisition of Sponsored Funds at Small to Mid-Level Colleges and Universities: A Guide for Program Development," Research *Management Review, 2,* (1988): 17-3 1.

[13] Sink, J.D., “Academic Research: the Faculty’s Role and Responsibility,” Society of Research Administrators (SRA) Journal, XVI, (1985): 19-27.

l4 Teague, G.V., “How Administrators Can Encourage Successful R&D,” Educational Record, 62, (1981): 36-39.

[15] Wodarski, J.S., “Building and Maintaining a Positive Culture of Research,” Society of Research Administrators (SRA) Journal, XXIII, (1991): 13-23.

[16] Tash, W., and Stahler, G., "Survey of Factors Influencing Changes in University Sponsored Research Levels,” paper presented at the National Association of State Universities and Land Grant Colleges (NASULGC) Forum on Research and Graduate Education, Ogunkeit, Maine, June 19-22,1992.

l7 Science Indicators: The I989 Report, National Science Board, (Washington, D.C.: National Science Foundation, 1989).

A Survey of Grant and Contract Activity in Colleges of Education

Sharon K. Davis and James I? O'Hanlon

Abstract. There is a lack of current literature which addresses proposal development or grant/contract activities in Colleges of Education. This study focuses on the current level of activity, expectations, incentives, support services, indirect cost return, and future plans regarding grantsmanship in Colleges of Education. The article is especially timely as the federal government is increasing its focus in the areas of science education, mathematics education and restructuring of educational systems.

INTRODUCTION

Teaching, research, and public service have historically been the stated mission of institutions of higher education. Although teaching has remained in the forefront, research and other scholarly activities began emerging as prominent factors in higher education as early as the late nineteenth century.[1] During the past ten years, universities have increased their focus on external support for such activities. This increase has resulted from several factors including faculty aspirations, the expectation of economic payoffs from research, and the pressure on university budgets caused by decreasing state and private support.[2]

Schools, Colleges, and Departments of Education (SCDE) in major universities are in a state of transition. This transition or restructuring is being pushed by a variety of forces. Certainly one of these is the university expectation that SCDEs be more productive in receiving external grant funds for the scholarly activities of their faculty such as research, curriculum development, demonstration projects and public service. To accomplish this SCDE need, research administrators must be prepared and must be willing to work with them in their efforts to attract external funds. Part of this preparation involves an understanding of perceptions and practices in SCDEs regarding seeking extramural funding.

Sharon K. Davis is the Director of the Office of Sponsored Programs and James P. O'Hanlon *is* the Dean of Teachers College at the University of Nebraska-Lincoln, Lincoln, *Nebraska 68588.0430.*

NEED FOR THE STUDY AN-D METHODOLOGY

Understanding the state of the art regarding grant/contract activity in the nation's SCDEs is a first step in determining how to upgrade this activity. This study is designed to provide information regarding the depth and breadth of grantsmanship activities in SCDEs. Attention is given to expectations, incentives, support services, use of indirect cost returns, and plans for enhancement of grant seeking activities.

The study surveyed deans of SCDEs which are members of the Holmes Group, a national consortium of over 90 research universities founded in 1986 committed to improving the quality of schooling through research and development and the preparation of teachers who will be career professionals. This group was selected because of the research and grant-receiving reputations of the universities it represents.

Many of the questions selected for inclusion in the survey instrument were based on previous studies[3,4] The survey instrument (Appendix A) included 32 items and was mailed to the deans of the SCDEs which comprise the Holmes Group. During the fall of 1991, 93 instruments along with a cover letter were mailed. There was a response rate of 84% which suggests a high level of interest among SCDE deans in this topic, and permits strong inference from the findings.

FINDINGS

Data about the size of the surveyed institutions are reported in Table 1 (number of faculty and number of students). While all are members of the Holmes Group, and thus considered to be research universities, the size of these SCDEs vanes considerably The surveyed institutions represent all regions of the country (see Table 2).

TABLE 1.

CHARACTERISTICS OF SCDE BY NUMBER OF FACULTY AND NUMBER OF STUDENTS

Number of Fulltime Faculty in SCDE	Institutions Number	Percent	Number of Undergraduate Students in SCDE	Institutions Number	Percent	Number of Graduate Students in SCDE	Instituations Number	Percent
Less than 50	12	(28)	Less than 500	30	(38)	Less than500	17	(22)
50 to 100	35	(44)	500 to 1,000	18	(23)	500 to 1,000	34	(43)
100 to 150	19	(24)	1,000 to 2,500	27	(34)	1,000 to 2,500	23	(29)
More than 150	3	(4)	More than 2,500	3	(4)	More than 2,500	5	(6)

TABLE 2.

LOCATION OF RESPONDENTS BY REGION OF COUNTRY

	Number	Percent
Northeast	15	(19)
Southeast	13	(17)
South Central	17	(22)
Midwest	18	(23)
Far West	16	(20)

Tables 3,4, and 5 provide information about the current level of grant activity in these SCDEs. The number of extramural grants or contracts received during the previous year ranged from less than ten to more than fifty. Two-thirds of these institutions received awards of more than $2 million but less than $10 million. In only nine institutions did more than half of the faculty submit proposals to external funding agencies during that year. However, 45 institutions reported that more than a quarter of the faculties made submissions.

TABLE 3.

NUMBER OF EXTERNAL GRANT/CONTRACT AWARDS TO SCDE DURING PREVIOUS YEAR

No. Grants/Contract	Number	Percent
1 to 10	14	(18)
11 to24	27	(34)
25 to 49	22	(28)
50 or more	16	(20)

TABLE 4.

DOLLAR AMOUNT OF GRANT/CONTRACT AWARDS TO SCDE DURING PREVIOUS YEAR

	Number	Percent
Less than $100,000	1	(1)
$100,000 to 500,000	7	(9)
$500,000 to 1,000,000	12	(15)
$1,000,000 to 10,000,000	52	(66)
$10,000,000 to 25,000,000	5	(6)
More than $25,000,000	0	(0)

TABLE 5.

LEVEL OF INVOLVEMENT OF SCDE FACULTY IN GRANTSMANSHJP DURING PAST TWO YEARS

Faculty Have Submitted Proposal to External Funding Agency	Number	Percent
Less than 25%	24	(30)
25% to 50%	45	(57)
50% to 75%	8	(10)
75% to 100%	1	(1)

Expectations for proposal writing presented a somewhat surprising picture as is shown in Table 6. The perception of SCDE deans was that their universities expected less in the way of proposal writing from SCDE faculty than from faculty of the university as a whole. The SCDEs, and presumably the deans, however, expected more of their faculties than was reported for university expectations in general.

A range of incentives and supports to encourage grant seeking was reported by the SCDEs. Table 7 lists the primary incentives used. The most used incentives were part of the regular evaluation of faculty (i.e., for promotions and tenure, annual evaluations). Forty-two percent indicated that salary increases were used as incentives with a slightly smaller proportion providing release time to write proposals. Half of the institutions reported having at least some faculty who were employed by external funds whose continued employment was dependent on success in grant seeking. Special incentives were identified by a few schools which might be useful for others to adopt; these included merit pay, plaques or certificates, and a personal professional development fund.

TABLE 6.

EXPECTATIONS OF FACULTY TO SUBMIT PROPOSALS FOR EXTERNAL FUNDING

	High Expectations		Middle Expectations		Low Expectations	
	Number	Percent	Number	Percent	Number	Percent
University expectation of all faculty	55	(69)	21	(26)	4	(5)
University expectation of SCDE faculty	30	(38)	41	(52)	8	(10)
SCDE expectation of SCDE faculty	57	(73)	17	(22)	6	(7)

TABLE 7.

INCENTIVES USED TO ENCOURAGE FACULTY TO SEEK EXTERNAL FUNDS IN SCDE

	Number	Percent
Part of faculty evaluation	68	636)
Recognition, prestige, status	59	(75)
Promotion and Tenure	55	(70)
Retain Employment (employed by external funds)	40	(51)
Salary increase	33	(42)
Released time to write proposals	30	(38)
Other: items noted include merit pay, an award or plaque, travel, and establishment of professional development fund for faculty member	19	(24)

Approximately three-fourths of the respondents affirmed that they provided personnel support for faculty in the preparation of grant proposals (Table 8). The most frequent means for this was the employment of proposal writing specialists. Interestingly, 17% of the institutions reported assigning an assistant dean to help write grant proposals which symbolically, at least, suggests importance being given to that activity.

All of the reporting institutions attested that their institutions have university grants offices which are available for various forms of assistance. However, the services of these offices were not highly used by SCDE faculty (Table 9). Only 22 of the institutions reported that more than half of their faculty made use of grants office assistance. Those who did use the university grants office were likely to rate these services as of high quality with only 25% rating the services as of low quality. (Table 10).

TABLE 8.

PERSONNEL SUPPORT FOR SCDE FACULTY TO PREPARE GRANT PROPOSALS

	Number	Percent
SCDE faculty member part time assignment for grant proposals	13	(17)
SCDE faculty member full time assignment for grant proposals	1	(1)
SCDE assistant dean assigned to write grant proposals	13	(17)
SCDE employs proposal writing specialist	27	(34)
University employs grant writing specialist who is assigned to SCDE	4	(5)
No support	21	(27)

TABLE 9.

PERCENT OF SCDE FACULTY WHO USED UNIVERSITY GRANTS OFFICE DURING PREVIOUS YEAR

	Number	Percent
Less than 25%	45	(57)
25% to 50%	24	(30)
51% to 75%	6	(8)
76% to 100%	5	(6)

TABLE 10.

QUALITY OF SERVICE OF UNIVERSITY GRANTS OFFICE

	Number	Percent
High	43	(19)
Medium	17	(22)
LOW	19	(25)

Concerning types of support services which were available through SCDE offices or the university grants office, both tended to offer a wide range of services with university offices being more active. Table 11 presents information which suggests that faculty at these SCDEs have considerable proposal writing support help accessible to them.

About four-fifths of the SCDEs responding to the survey reported receiving a return of indirect costs from the university. Of these 62 SCDEs, seventy-two percent reported receiving the same percentage return on indirect costs as other campus units; eight percent did not receive the same percent return as other units; and ten percent did not know. In addition, eight percent stated they either received no return of indirect cost monies or negotiated the amount returned to the SCDE. These funds are used in a variety of ways (Table 12). Some are returned to the generating department or faculty member while some are used for purposes such as equipment purchase and travel.

TABLE 11.

PROPOSAL WRITING SUPPORT SERVICES AVAILABLE AND SOURCE OF SUPPORT

	University Grants Office (Pre,award)		SCDE Grants Office		Not Available		Don't Know	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Sources of funding information	75	(95)	53	(67)				
Match funding source with faculty interest	53	(67)	44	(56)	2	(3)	6	(8)
Proposal writing workshops	44	(61)	26	(33)	10	(13)	4	(5)
Assist with project design	27	(34)	52	(66)	6	(8)	1	(1)
Assist with proposal preparation	39	(50)	61	(77)	4	(5)	1	(1)
Liaison with agencies	56	(71)	44	(56)	3	(4)	6	(8)
Campus clearance	69	(88)	48	(61)				
Negotiations with agency	60	(76)	26	(33)	4	(5)	4	(5)

TABLE 12.

SCDE USES FOR RETURN INDIRECT COSTS

	Number	Percent
Purchase equipment	62	(79)
Partial return to generating department	45	(57)
Travel	33	(42)
Support proposal writing activity	33	(42)
Return to generating faculty member	26	(33)
Folded into operating budget	19	(24)
Matching funds for future grants	I1	(14)
Full return to generating department	34	(5)

DISCUSSION AND IMPLICATIONS

Grantsmanship activities can be found at SCDEs across the nation. It is highly likely that these activities will increase. Deans of SCDEs and Directors of Research Administration Offices need to be prepared to facilitate these activities.

Deans of SCDEs have a high expectation of their faculty to be involved in externally sponsored scholarly activities; and, what is more significant, deans expect to place an increased emphasis on grantsmanship activities in the next two years. Although deans of SCDEs have a high expectation for their faculty to develop proposals for extramural funding, there is a strong possibility that they fail to convey this expectation to their faculty. This is

evidenced by the relatively low percent of faculty involved in grantsmanship-and the number of proposal actually submitted.

It would benefit deans to re-examine how they are conveying their expectations regarding the importance of grant seeking to their faculties. Deans need to design ways to convey the importance of grant seeking to faculty. For example, giving grantsmanship activity a primary place on the agenda for faculty meetings suggests its importance. Faculty should be aware of sources of funding available, proposal deadlines, and who is working on proposals for these deadlines. Another way deans can promote awareness is by developing a bookshelf in the SCDE library or in the deans office devoted to grantsmanship; a calendar should be placed in this library or the dean's office which outlines deadline dates for targeted proposals.

Personal recognition of recipients of grant/contract awards through a variety of sources can serve as an incentive for faculty to pursue proposal preparation. This recognition can be accomplished through means such as the SCDE newsletter, or a plaque or certificate presented at a year-end SCDE awards ceremony. Another incentive is recognition through a financial reward system. Guidelines should be created to reward faculty who are active in proposal development as well as those receiving external funds.

Respondents *to* the survey suggested that a personal professional development fund, set up for individuals who had received grant awards, would serve as an incentive for further activity. These funds could provide for travel to professional meetings to enhance research skills, travel to Washington, D.C. to visit with program officers, or attendance at workshops designed for professional development.

The SCDE Promotion and Tenure process is important in supporting grantsmanship. The standards for earning promotion and tenure should reward and encourage seeking of external funds that are consistent with individual, departmental, and SCDE goals.

Support services at the SCDE are imperative to promoting a quality program of grantsmanship. Services can include secretarial support, a mentoring system, employment on a retainer basis of a proposal writer and a SCDE grants office with a person designated as a grant liaison/proposal writer. Presently each SCDE has a cadre of faculty members who are experienced and successful proposal writers. These individuals should be sought out to devote some of their time to mentoring those faculty interested in developing their proposal writing skills. Employing a proposal writer on a retainer basis allows a unit to restrict costs for grantsmanship activities by paying an hourly wage or by commission on a funded project.

The SCDE that establishes a grants office including an individual who could serve as a grant liaison and a proposal writer is able to develop relationships with federal agencies, state agencies, and the state's congressional delegation. Such an office would allow for individual faculty members to receive in-house support for their grant activity and also have a designated individual to write major projects for the SCDE.

The return of indirect costs to SCDEs is a vital consideration and may be part of the incentive/reward system. The majority of the respondents (79%) noted the return of indirect costs with 72% indicating the same rate of return as other units in the university. Focusing use of this money on the incentive structure and services that support and enhance a thriving grantsmanship program of activities is an important step for SCDEs.

Directors of the university grants office have much groundwork to do in the SCDE. Research administrators need to work more closely with and better understand the SCDE and its needs. Research administrators need to ask why faculty from SCDEs are not making greater use of the university grants office. The university grants office should be more pro-active in presenting workshops to faculty, providing information, and providing support services to faculty - especially those faculty who are not familiar with or skilled in grantsmanship. Research administrators have an obligation to work with the deans and department chairs to make them aware of the potential for extramural support and of the services the university grants office provides. Since research administrators have campus wide responsibilities, they have the advantage of working closely with deans and department chairs across all units of the university. Some of these colleges or departments have established policies, procedures, and practices which enable or encourage faculty within that unit to be successful in grantsmanship. Sharing these proven policies, procedures, and practices with all deans and chairs will enhance grantsmanship efforts which will benefit all units of the university.

Through university wide faculty data base systems, research administrators are in a position to create opportunities for interdisciplinary research. Individuals can be brought together from various units. For example SCDE faculty can collaborate with faculty from the physical sciences, mathematics, and engineering, to develop an interdisciplinary approach for appropriate projects in response to an RFP

CONCLUSION

SCDEs have a high expectation of their faculty regarding proposal development and grant/contract activity, an expectation that presently is

only partially being realized. In the future, the administrators of SCDEs anticipate an increase of grantsmanship activity among their units.

Research administrators have university-wide responsibilities and must be prepared to assist all colleges and departments in their grantsmanship activities. They cannot take for granted that all university administrators and faculty members are aware of the services provided by the university grants office; nor can they expect that all units will have the same needs for all services. Research administrators must be pro-active in serving all units of the university and must reach out to help them realize their grant seeking potential. As SCDEs enhance the grantsmanship infrastructure in the coming years, research administrators must be prepared to provide support and assistance.

REFERENCES

l Geiger, R.L., To Advance Knowledge: The Growth of American Research Universities 1900- 1940. New York: Oxford University Press.

[2] Bergen, Doris, et. al. "Federal Funding of Higher Education Proposals: Relationship of Research/Sponsored Programs Office Characteristics to Success Rates". Paper presented at the Annual Meeting of the American Education Research Association. San Francisco, CA, March 1989.

[3] Davis, Joe L. and Davis, Sharon K., "New Roles for Student Affairs in Fund Raising and Development," New Directions For Student *Services.* Jossey-Bass, (in press).

[4] Davis, Sharon K., "Research Administration at Predominantly Undergraduate Institutions with a Small Volume of Sponsored Programs," Research Management Review, Volume 2, Number 2, (Fall 1988): 41-52.

APPENDIX A

A SURVEY OF GRANT AND CONTRACT ACTIVITY IN COLLEGES OF EDUCATION

Directions: Please circle all appropriate responses and indicate comments as needed.

GRANT WRITING ACTIVITIES

1. What is the level of expectation your University has for faculty to write grant proposals for external funding?

   High Expectation — Low Expectation

   5 4 3 2 1

2. What is the level of expectation held for the College/School/Department of Education (CSDE) faculty in comparison to the total University faculty regarding writing grant proposals for external funding?

   Higher Expectation — Lower Expectation

   5 4 3 2 1

3. What is the level of expectation your CSDE has for its faculty to write grant proposals for external funding?

   High Expectation — Low Expectation

   5 4 3 2 1

4. What incentives are used to encourage faculty in your CSDE to seek external funds?
   a. Promotion and tenure
   b. Retain employment - if employed by external funds
   c. Recognition, prestige, status on campus
   d. Released time to write proposals
   e. Salary increase
   f. Considered part of faculty evaluation
   g. Other (please identify)

   _____

5. What percent of faculty in your CSDE would you estimate have submitted a proposal to a funding agency during the past two years?
   a. Less than 25%
   b. 26% to 50%
   c. 51% to 75%
   d. 75% to 100%

6. What percent of the faculty in your CSDE would you estimate have received formal instruction in writing grant proposals in the last 2 years?
   a. Less than 25%
   b. 26% to 50%
   c. 51% to 75%
   d. 75% to 100%
   e. Don't know

7. For what purposes have faculty in your CSDE developed proposals for external funding?
   a. Research projects
   b. Instruction projects
   c. Public service projects
   d. Travel
   e. Fellowships
   f. Purchase of equipment
   g. Other (please identify)

   _____

8. Does your University have an office dedicated to assisting faculty seeking external grants? (Sometimes called a Grants Office or a Sponsored Programs office)
   a. Yes
   b. No (If response is no, please go to question # 10)

9. How would you rate the quality of service this office provides to your faculty?

High				LOW
5	4	3	2	1

10. What percent of the faculty at your CSDE used the services of this office during the past year? Please provide a best estimate.
    a. Less than 25%
    b. 26% to 50%
    c. 51% to 75%
    d. 75% to 100%

11. Indicate if your CSDE has any of the following.
    a. Faculty member assigned part time to write grant proposals
    b. Faculty member assigned full time to write grant proposals
    c. Assistant dean assigned to write grant proposals
    d. Grant writing specialist employed by the CSDE
    e. Grant writing specialist employed by the University who is dedicated to your college
    f. If none, go to #14

12. Does this service provide your faculty the support they need?

High level of support				Low level of support
5	4	3	2	1

13. What percent of your faculty would you estimate use the services of your CSDE personnel listed in item # 1 l?
    a. Less than 25%
    b. 26% to 50%
    c. 51% to 75%
    d. 75% to 100%

14. Please indicate if the following grant writing support services are available and from which office are they available.

	University Grants Office	Coll. of Educ. Grants Office	Not available at university	Don't know
a. Information regarding sources of funding				
b. Matching funding sources with faculty interest				
c. Grantwriting workshops				
d. Assistance with project design				
e. Assistance with proposal preparation				
f. Liaison with external agencies				
g. Provide campus clearance and signatures				
h. Conduct negotiations with funding agencies				

15. As Dean of the CSDE, do you see a need to increase the number of proposals developed for external funding by your faculty?

High need				Low need
5	4	3	2	1

16. Do you anticipate doing any of the following in the next two years to provide increased support for faculty who plan to write grant proposals?
    a. Provide released time for grant writing
    b. Provide secretarial support for typing proposals
    c. Provide travel funds for faculty to visit funding agencies
    d. Establish a grant writing office within the College of Education
    e. Employ a person to assist with grant writing support
    f. All services noted above are already provided
    g. Other (please name)

    _____

17. What factors will inhibit you from providing increased support for grant writing efforts of faculty?
    a. Increased enrollment
    b. Lack of support services
    c. Lack of financial resources
    d. Lack of experienced grant writers in the college
    e. Lack of interest on part of faculty
    f. Lack of support from the institution
    g. Other (please name)

    _____

INDIRECT COSTS GENERATED FROM GRANTS/CONTRACTS

18. Does the CSDE receive a return of indirect costs by the University?
    a. Yes
    b. No

19. Does the CSDE receive the same percentage returned on indirect costs as other colleges on your campus?
    a. Yes
    b. No.
    c. Don't know
    d. Other (please explain)

    _____

20. How does the CSDE use the indirect costs returned to it?
    a. Purchase equipment
    b. Travel
    c. Full return to department that generated it
    d. Partial return to department that generated it
    e. Becomes part of operating budget
    f. Support grant writing activity
    g. Return to faculty member who received the award
    h. Matching funds for future grant awards
    i. Other (please identify)

    _____

INTERNAL (ON CAMPUS) RESEARCH FUNDS

21. Are institutional funds available for your CSDE faculty to support research from the following sources?
    a. Foundation associated with the University
    b. University Research Council (or similar group)
    c. Specific funds set aside by the university
    d. No funds available
    e. Don't know
    f. Other (please identify)

    _____

22. If institutional funds are available to CSDE faculty, please indicate activities funded.
    a. Summer stipend
    b. Travel
    c. Released time
    d. Professional leave
    e. Purchase equipment
    f. Operating supplies, materials
    g. Employ research assistants
    h. Other (please explain)

    _____

23. Are funds available specifically for research purposes within your CSDE budget?
    a. Yes
    b. No

24. If funds are available from within your CSDE for faculty research or other scholarly activities, please indicate the activities funded.
    a. Summer salary
    b. Travel
    c. Released time
    d. Professional leave
    e. Purchase equipment
    f Operating, supplies, materials
    g. Employ research assistants
    h. Other (please identify)

    _____

25. If funds are available from within your CSDE for faculty research or other scholarly activities, please indicate the total amount available for any given year,
    a. Less than $1,000
    b. $1,000 to $5,000
    c. $5,000 to $10,000
    d. $10,000 to $50,000
    e. More than $50,000

INSTITUTIONAL DEMOGRAPHICS

26. What is the classification of your institution (see attached sheet for definitions) ?
    a. Research University I
    b. Research University II
    c. Doctorate Granting University I
    d. Doctorate Granting University II
    e. Comprehensive University/College I
    f. Comprehensive University/College II
    g. Liberal Arts College I
    h. Liberal Arts College II

27. How many full time faculty are your CSDE?
    a. Less than 50
    b. 50 to 100
    c. 100 to 150
    d. More than 150

28. How many undergraduate students (head count) are enrolled in your CSDE?
    a. Less than 500
    b. 500 to 1,000
    c. 1,000 to 2,500
    d. More than 2,500

29. How many graduate students (head count) are enrolled in your CSDE?
    a. Less than 500
    b. 500 to 1,000
    c. 1,000 to 2,500
    d. More than 2,500

30. Please indicate your Holmes Group Region.
    a. Northeast
    b. Southeast
    c. South Central
    d. Midwest
    e. Far West

GRANT/CONTRACT AWARDS

3 1. Please indicate the approximate number of grant/contract awards made to your CSDE during the past fiscal year from external sources.
    a. 1 to 10
    b. 11 to24
    c. 25 to 49
    d. 50 or more

32. Please indicate the approximate dollar amount award to your CSDE from external sources during the past fiscal year.
    a. Less than $100,000
    b. $100,000 to $500,000
    c. $500,000 to $1 ,ooo,ooo
    d. $1 ,OOO,OOO to $10,000,000
    e. $10,000,000 to $25,000,000
    f. More than $25,000,000

Instructions to Authors

The National Council of University Research Administrators (NCURA) welcomes contributions of original manuscripts to Research Management Review covering any aspect of research administration. Manuscripts should be submitted to: Editor, Research Management Review, NCURA, One DuPont Circle, N.W., Suite 220, Washington, D.C. 20036.

All manuscripts, including those written at the invitation of the editor, are subject to peer review by the editorial advisory board or selected reviewers; however, the final decision as to which articles are to be published will be made by the editor. Research Management Review accepts manuscripts for review with the understanding that the submission has the approval of all authors involved, and that the same work is not presently submitted elsewhere nor will it be if accepted for publication by RMR. A signed agreement will be required which assigns the copyright from the author to NCURA.

Manuscripts. An original and one copy must be submitted. Manuscripts must be machine copies, double-spaced throughout (including references) , with pages numbered consecutively.

Include on the first page the title, name(s), and affiliation(s) and mailing address of the author(s). At the bottom of this page, note the number of manuscript pages, figures, and tables. Places where figures and tables are to appear in the published paper should be marked in the margins of the manuscript.

An abstract of 100-200 words summarizing the topic and principal conclusions should preface the manuscript.

Provide a brief (less than 100 words) author's background statement with the manuscript.

References should be numbered consecutively and listed together at the end of the manuscript, before the acknowledgement, if any. The following format should be used for references:

Public Document. Division issuing the document, Title, Author - if given, Report No. (City: Publisher - if different from the issuing division, 1991) 140-42.

Periodical or Journal. Author's Last, First Name, "Article Title," Periodical X (Month 1991): 18.

Book. Author's Last, First Name, Title (City: Publisher, 1991), 140-42.

Please avoid the use of footnotes.

Tables should be numbered consecutively in the order in which they are introduced in the text, using Arabic numerals, preceded by the word "Table." All tables should bear appropriate headings.

Figures. Identify each drawing, illustration, chart, or graph consecutively by using Arabic numerals preceded by the word "Figure." Citations or captions must be provided with each figure.

Submit figures and tables as original black-ink drawings, negatives, or glossy prints only, ready for reproduction. Include reference copies with duplicate manuscript. Lettering should be uniform and large enough to be legible after reduction of up to 50 percent.

Letters to the Editor. Brief letters commenting on published articles are invited, with the understanding that they may be edited and published. Comments on published articles are forwarded to the author for reply at the discretion of the author.