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EDITOR'S PREFACE

This issue of *Research Management Review* continues its tradition of providing an interesting mix of topics explored by a series of authors each bringing considerable and varied expertise to their inquiries. First, Mark E. Welker, the William L. Poteat Professor of Chemistry and Associate Vice Provost for Research at Wake Forest University and Alan R. Cox of the higher education consulting firm The Planning Edge look at the results of a survey of senior research administrators at Carnegie doctoral/research universities. The survey provides valuable insight into perceptions concerning the importance of research to an institution's mission, research culture, research planning, economic development, and technology transfer. Several trends of vital importance to anyone involved in research administration are well documented.

Teri Melese, Associate Adjunct Professor of Medicine and Director of Research Technologies and Alliances at the University of California, San Francisco, provides a detailed roadmap for academic medical centers wanting to build and manage alliances with corporate partners. She points out that the skills possessed by academic medical centers in the basic and clinical sciences combined with the compounds, medicinal chemistry, and know-how of pharmaceutical and biotechnology companies can lead the way to the development of better drugs. Sound methods for establishing these fruitful alliances are explored in this article.

The issue takes on an international flavor when Peter Kavanagh, Head of Innovation and Industry Services, Faculty of Science, and Andy Maguire, Head of Innovation and Industry Services, Faculty of Business, both of the Dublin Institute of Technology in Dublin, Ireland, partner with James J. Casey, Jr., Executive Director of Sponsored Programs at Cardinal Stritch University, Milwaukee (and former editor of *Research Management Review),* to focus on technology transfer practices in Ireland, particularly in small and medium size enterprises, and make some interesting comparisons between practices in Ireland and in the United States.

Lastly, Thomas J. Roberts, Associate Vice Provost for Research at Florida Gulf Coast University, and Jess House, Associate Professor of Educational Research, Technology, and Leadership in the College of Education, University of Central Florida, share the results and their analysis of a recent survey exploring the demographics of research administrators in the southeastern United States. The article provides an engrossing accounting of who researcher administrators tend to be: their gender, level of formal education, age, experience in the field, and last but not least, their salaries. Do not miss this article if you would like to see how well you fit the profile!

WILLIAM SHARP, PH.D.
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SEPTEMBER 2006

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A Report on Research Activities at Research Universities

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ABSTRACT

Results of a survey of senior research administrators at Carnegie Doctoral/Research Universities - Intensive and -Extensive are presented. The survey results are discussed. Survey topics included the importance of research to the institution's mission, research planning and priority-setting, research culture, research publicity, economic development and technology transfer, and a request to the survey respondents to identify important positive and negative trends in research administration.

INTRODUCTION

Systems for understanding, managing, and improving research activities and research administration at U.S. universities are the subject of a number of research administration publications (Kirby, 1996; Opel, 1993; Valentine, 1992. In at least one previous case, survey research was used in one of these studies (McCallister, 1993). Rather than propose a new system or review systems, we decided to conduct a survey of senior university research administrators on a broadly defined set of their institution's current research activities. In spring 2005, the senior research administrator at each of the 250 Carnegie classified doctoral/research universities - Extensive and -Intensive was identified (Shulman, 2001). They were contacted by email and asked to answer an on-line survey. The purpose of the survey was to gain a better understanding of national trends in research planning and priorities, research culture, research publicity, economic development, and technology transfer. Ninety-five senior research administrators completed the survey, for a response rate of 38%. Responses came from 35 states. Two-thirds of the respondents were from Doctoral/Research Universities -Extensive and one-third were from

Doctoral/Research Universities -Intensive. Two-thirds represented universities with undergraduate enrollments over 10,000; 72% were public and 28% were private institutions.

Survey topics included:

- The Importance of Research to an Institution's Mission
- Research Planning and Priority Setting
- Research Culture
- Research Publicity
- Economic Development and Technology Transfer
- Important Trends

These survey topics and results are presented and discussed below. The survey was intended to stimulate thought, not necessarily to recommend specific actions, and to provide insights into the management of research at U.S. universities.

PRESENTATION AND DISCUSSION OF SURVEY RESULTS

The Importance of Research to an Institution's Mission

In general, research was deemed of equal importance as academics to the mission of an institution. Seventy percent of respondents believed the research role is as important to their University's mission as the academic role (Table 1).

Table 1. Importance of Research to the Institution

How important is research to the mission of your institution?

The most important role of the institution	12%
Equally as important as the academic role, but not more important	**70%**
Important, but less important than the academic role	18%
Quite a bit less than the academic role	0%

Research Planning and Priority Setting

The majority of respondents believed that their institutions establish overall priorities as part of their planning, with 65% agreeing completely and 31% agreeing somewhat. They are less likely to agree that *research* priorities are established as part of the overall academic planning of their institution, with only 35% agreeing completely and 49% agreeing somewhat. The majority of respondents did not believe that research priorities are always reviewed on a regular basis or that infrastructure costs to support research are always planned based on priorities. They also did not agree completely that institutional research priorities are broadly known among faculty (Table 2).

Table 2. Importance of Research Planning and Priority Setting to the Institution

How much do you agree or disagree:	Agree Completely	Agree Somewhat	Disagree Somewhat	Disagree Completely
Overall institutional priorities are established as part of the overall planning of our institution.	**65%**	31%	3%	1%
Overall research priorities are established as part of the overall academic planning of our institution.	**35%**	49%	15%	1%
Research priorities are reviewed on a regular basis.	29%	45%	21%	5%
Infrastructure costs (start-up, equipment, renovation/building, etc.) to support research are planned based on priorities.	21%	61%	14%	4%
Research priorities are not formal and research projects are based primarily on individual efforts.	16%	36%	37%	12%
Institutional research priorities are broadly known among faculty.	12%	49%	35%	4%
Infrastructure costs to support research are considered primarily when grants are being submitted.	8%	39%	42%	11%

The majority, but not all, research administrators believe that having overall institutional research priorities are "very" important (Table 3).

Table 3. Importance of Overall Institutional Research Priorities

How important is it to have overall institutional research priorities?

Very	**64%**
Somewhat	26%
Slightly	3%
Not at all	6%

When research priorities are established, generally the senior research administrator, chief academic officer, and president/chancellor are involved. Faculty committees, senior administrative officers, and individual faculty are involved in setting research priorities at about half of the institutions (Table 4).

Table 4. Groups Involved in Setting Research Priorities

If research priorities are established, who is involved?

Senior Research Administrator	**86%**
Chief Academic Officer	**78%**
President Chancellor	**72%**
A Faculty committee	58%
Senior administrative officers	52%
Individual faculty	43%
Other	7%

Research Culture

At about 33% of these institutions, the research mission is known and embraced "very well" among faculty and staff. It is known and embraced by faculty and staff "somewhat" among 58% of these institutions (Table 5).

Table 5. Knowledge of and Embracing of Research Mission

How well is the research mission known and embraced among faculty and staff?

Very	35%
Somewhat	**58%**
Slightly	7%
Not at all	0%

Different activities are used to stimulate a strong research culture at these universities. The most common method is to provide publicity in campus publications and on the web. External publicity, beyond the campus, and internal competitions for PI seed funding are the next most common methods, followed by awards/recognition and financial incentives. Guaranteed sabbaticals, other forms of competitive internal funds, bridge funds, or leave programs are less common ways of stimulating a strong research culture (Table 6).

Table 6. Use of Awards and Incentives to Stimulate Research Culture

How much, if any, are the following used to stimulate a strong research culture?	Very	Somewhat	Slightly	Not at all	Very + Some
Publicity in campus publications or the web	**59%**	34%	7%	0%	**93%**
Publicity beyond your campus	**42%**	45%	11%	2%	**87%**
Internal competitive seed funds for PIs	**41%**	41%	12%	6%	**82%**
Awards or other forms of appreciation (dinners, receptions, etc.)	26%	46%	26%	2%	**72%**
Financial incentives	25%	55%	14%	6%	**80%**
A guaranteed sabbatical program	22%	26%	19%	33%	48%
Internal competitive seed funds for centers	16%	37%	28%	19%	53%
Internal competitive travel funds	14%	37%	28%	22%	51%
Bridge funds for previously externally funded but declined PIs	13%	35%	35%	18%	47%
Other	9%	0%	0%	0%	9%
Internal competitive symposium funds	6%	26%	35%	33%	32%
A competitive leave program	5%	22%	35%	38%	27%
Increased frequency of leave eligibility tied to external support obtained for research	1%	19%	23%	56%	20%

Incentives, awards, or other forms of recognition are used to varying degrees, and research administrators are split on their relative importance: 58% believe they are very important; 37% believe they are somewhat important; and 13% believe they are only slightly or not at all important (Table 7).

Table 7. Importance of Awards and Incentives to Research Mission

How important, if at all, are incentives, awards or other forms of recognition to the research mission?

Very	**50%**
Somewhat	**37%**
Slightly	10%
Not at all	3%

Research Publicity

About three-quarters of institutions regularly publicize faculty research activities, funding, and results. Virtually all institutions have some formal schedule for publicizing research (Table 8).

Table 8. Institutional Publicity about Research Activities, Results, and Funding

How often does your institution publicize research activities and results, and research funding?

	Research Activities/Results	Research Funding
Ongoing basis through a variety of means	**74%**	**71%**
Periodically, but not more than quarterly	15%	13%
Occasionally; not more than twice a year	8%	13%
We have no formal schedule	3%	2%

The most common forms of publicity, used by 9 out of 10 institutions, are press releases to the general media and institutional publications, such as alumni magazines. Over half use press releases to higher education media, a research magazine, and an annual research report to publicize research activities and results. Research-extensive institutions are a little more likely than research-intensive institutions to use research magazines (64% vs. 47%). (See Table 9.)

Table 9. Methods used to Publicize Research Activities, Results, and Funding

Which methods do you use to publicize research activities, results, and research funding?

	Research Activities/Results	Research Funding
Press releases to the general media	**87%**	60%
In general institution publications (such as an alumni magazine)	**87%**	63%
Press releases to higher education media	59%	39%
A research magazine	58%	40%
An annual research report	54%	64%
Special research summaries	47%	41%
Individual letters from the president or senior academic officer	28%	26%

Economic Development and Technology Transfer

Among these institutions, 50% play a large role in economic development, while 41% play a slight role. Larger universities (more than 10,000 undergraduates) and research-extensive universities are a little more likely to play a large role than are institutions with fewer than 10,000 undergraduates or research-intensive institutions (60% versus 50%). (See Table 10.)

Table 10. Role Played by Institution in Economic Development

What role, if any, does your institution play in economic development?

Large role	**56%**
Slight role	**41%**
At most a minor role	0%
No role	2%

The large majority of these institutions have an Office of Government Relations (85%) and a Technology Transfer Office (84%). Virtually all have a patent copyright policy that shares proceeds between the university and the inventor (Table 11).

Table 11. Technology Transfer Mechanisms at Universities

Does your university have:

A patent copyright policy which shares proceeds between the University and the inventor	**93%**
An Office of Government Relations	**85%**
A Technology Transfer Office	**84%**
A Research Foundation	41%

The annual number of patents awarded to faculty and staff varied substantially among institutions: 5% averaged over 50 per year; 18% averaged 25 to 50; 26% averaged between 10 and 24; 29% had between 3 and 9; and 20% had two or fewer, on average (Table 12).

Table 12. Patents Awarded, On Average, 2002–2005
Approximately how many patents were awarded to faculty and staff, on average, for each of the last 3 years?

Number of patents	% institutions	
200+	2%	
100-200	1%	
51-100	2%	
36-50	10%	
25-35	8%	
20-24	6%	
15-19	6%	
10-14	**14%**	
5-9	**18%**	**53%**
3-4	**11%**	
2	**10%**	
1	3%	
0	7%	

The Advancement or Development Offices of these universities help to solicit funds for research to varying degrees; roughly a quarter were involved to each degree (Table 13).

Table 13. Advancement or Development Office Involvement in Research Funding Solicitations

To what extent is the development or advancement office of the university involved in helping to solicit funds for research?

Very	23%
Somewhat	28%
Slightly	31%
Not at all	18%

Important Trends Affecting the Overall Research Environment

Clearly, declines in federal funding for research are viewed as the biggest trend, positive or negative, affecting the nation's research universities. State funding, compliance questions, and start-up costs are lower-level negative trends. Positive trends are mentioned much less frequently; the most common is an increase in collaborations among researchers (Table 14).

Table 14. Trends Affecting the Research Environment

Negative	#	Positive/neutral	#
Funding (total)	**51**	**Increased collaboration**	**9**
Federal Funds – decline in (net)	**38**		
Decline – general	30	**Administrative support**	**5**
NIH/NSF	5	Strong, growing	4
Federal climate in general	1	More understanding	1
War related	2		
State	**7**	**Impact on economic development**	**5**
Institution specific	**2**	Growth in importance of tech research	1
General, non-specific source	**3**	Helps economic development	1
Decline in all but health research $	**1**	Legislators understanding impact	1
		More community support	1
Compliance total	**9**	State understanding impact	1
Compliance: increases (increase costs)	6		
Other	3	**More facilities for research**	**4**
Start-up costs	**6**	**Other**	
New faculty/researchers	4	More funding	1
Other	2	More faculty applying for grants	1
		More support for graduate students	1
Impact of U.S. defense work	**3**	More corporate interaction (+, -)	1
Fewer intl students/visa issues	2	Greater focus on health sciences	1
Other	2		
Facilities, infrastructure	**5**		
Outdated, insufficient	3		
Infrastructure needs	2		
Lack of quality personnel	**3**		
Faculty	1		
Graduate students	1		
Services to PI's	1		
Other			
Politics in research	3		
Greater emphasis on teaching vs. research	1		
Lack of incentives for patents in tenure	1		

RESPONDENT CLASSIFICATION/SURVEY COLLECTION DATA

The majority of institutions responding to this survey were large, public Doctoral/Research -Extensive universities. Results came from 35 states located throughout the United States. (See Table 15.)

Table 15. Information on Survey Participants

Public or private institution		**Undergraduate enrollment**	
Public	**72%**	**Over 10,000**	**68%**
Private	28%	5,001 to 10,000	17%
		3,001 to 5,000	9%
		1,000 to 3,000	5%
		Less than 1,000	0%
Type of institution		**Position**	
Doctoral/Research University -Extensive	**64%**	**Administration** Faculty	**88%** 61%
Doctoral/Research University -Intensive	**36%**	Research Director Other	56% 4%

State

NY	**8**	**IL**	**4**	NJ	2	AL	1	NH	1
PA	**7**	**MA**	**4**	NM	2	ID	1	NV	1
CA	**6**	**VA**	**4**	ND	2	IN	1	OR	1
NC	**6**	MI	3	OK	2	IO	1	SC	1
OH	**6**	AR	2	TN	2	KS	1	WA	1
TX	**6**	DC	2	UT	2	LO	1	WV	1
FL	**4**	MO	2	NV	2	MN	1	WY	1

SUMMARY AND CONCLUSIONS

Among these research directors and administrators, **research is deemed to be as important as**, but not more important than, their **institution's academic role.**

Policies are not universal. While overall institutional priorities are commonly established, research priorities are less likely to be established. Two-thirds of respondents agree completely that institutional priorities are established, while only one-third agree completely that research priorities are established. Respondents agree only somewhat that research priorities are regularly reviewed or that research infrastructure needs are planned based on priorities. They also agree only somewhat that research priorities are broadly known among faculty. However, two-thirds believe that having institutional research priorities is very important.

When research priorities are established, the senior research administrator, chief academic officer and president/chancellor are most often involved. The majority of respondents believe their institution's faculty and staff know and embrace the research mission only "somewhat." A third of the respondents know and embrace the research mission "very well."

The most common activities used to stimulate the **research culture** are publicity in campus publications and on the web (93%); external publicity (87%); and internal competitions for PI seed funding (82%). Research administrators are split on the importance of incentives, awards, and other forms of recognition, with half believing they are very important, and 37% believing they are only somewhat important.

Faculty research activities, funding, and results are usually publicized on an ongoing basis using means that include press releases to the general media and internal publications.

Economic development is important. Over half of the universities play a large role in economic development and technology transfer; with the rest playing a slight role. The large majority have an Office of Government Relations (85%) and a Technology Transfer Office (84%) and close to half (41%) have now set up a research foundation. Virtually all have a patent copyright policy that shares proceeds between the university and the inventor.

The number of patents awarded yearly varies substantially among these institutions, with some receiving more than 100. Over half of the institutions receive fewer than 15 patents per year.

The **most important trend affecting the overall research environment** is the decline in federal funding. This trend was mentioned by 40% of respondents—more than four times more frequently than any other trend, positive or negative. The next most mentioned trends were the increases in compliance requirements or costs (negative) and an increase in collaboration among researchers (positive).

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Building and Managing Corporate Alliances in an Academic Medical Center

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ABSTRACT

Academic Medical Centers (AMCs) are in a position to help foster the development of better drugs by combining their considerable skills in the basic and clinical sciences with the compounds, medicinal chemistry and know-how of pharmaceutical and biotechnology companies to develop a more innovative and coordinated approach to therapeutic intervention. To capitalize on this opportunity AMCs will need to develop an integrated internal administrative process to develop, manage, and implement corporate alliances, design the optimum structure for these relationships, proactively negotiate the actual partnership agreements, provide project management for collaborative projects, and make informed business and administrative decisions in a timely manner[1,2,3,4]. The development of an AMC "corporate alliance" team that functionally and philosophically unites the academic administrative offices traditionally involved in corporate partnerships (e.g., sponsored research agreements, clinical trial agreements, material transfer agreements, technology transfer, etc.) is essential[5,6,7,8,9]. Oversight of this team will require individuals with business and alliance experience; an ability to think both strategically and opportunistically; a detailed understanding of the goals, responsibilities, and governance of AMCs; a first-hand knowledge of the biotechnology and pharmaceutical industries; an extensive network of industrial contacts; and an ability to effectively communicate a vision and build productive relationships at the level of the individual and the institution. Organizations exist that develop and promote "best practices" for alliance practitioners in the corporate sector and such practices will be highly beneficial if adopted in AMCs[10,11].

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INTRODUCTION

Academic medical centers (AMCs) accept a remarkable challenge: to integrate and achieve with excellence four core missions: delivery of healthcare; education and training of future generations of clinicians and investigators; discovery of new knowledge through incisive, decisive research; and the export of knowledge through effective interactions with industry and government. Each mission is critical, and each must be interactive with and respectful of the others[12]. We focus here on the particular challenges and opportunities of the AMC/industry interface, but we remain mindful of the broader spectrum of AMC responsibilities, and we consider as well the issues associated with structuring this interface in a way that facilitates integration with the other core missions.

The health of the AMC rests on its ability to make choices and timely decisions, especially in a time of reduced federal and state resources. Informed decision making is essential to leverage the value of existing resources and to assure that investments meet the needs of the relevant stakeholders and serve the mission of the AMC[2,4,12]. Many opportunities are lost due to the lack of a defined process by which investigators become aware of, and connected to, existing campus or external resources, including (a) knowledge of potential collaborative research efforts, (b) technology resources, (c) corporate alliances, and (d) licensing opportunities.

A number of key general concepts are outlined to be considered when forming relationships with corporate partners in a biomedical setting. Suggestions are also made about how to improve the business and alliance environment such that working relationships can be effectively guided to enhance campus innovations and increase the interaction among corporate enterprises, campus core technology facilities and the campus research community.

THE CHANGING FACE OF BIOMEDICAL RESEARCH MAKES SOUND BUSINESS DECISIONS AND CORPORATE ALLIANCES AN IMPERATIVE

The practice of biomedical research is changing[1,2,12]. It is evolving towards a bigger enterprise involving multiple investigators from multiple institutions, both academic and corporate[1]. No single investigator can assemble all of the required technologies and expertise to understand complex disease mechanisms and to translate that scientific knowledge into disease treatment. To move discoveries effectively between bench and bedside requires close ties among the basic, clinical, and corporate research enterprises.

Federal agencies also realize the need to unite the core competencies of academia and corporations to develop better drugs for the treatment of disease[13,14,15]. As an example, the National Institutes of Health developed the AP-4 Center Grants that asked academic institutions to identify corporate collaborations that would focus on treatment of orphan cancers **(http://grants.nih.gov/grants/guide/rfa-files/RFA-CA-04-005.html).** However, such relationships have traditionally been compromised by distrust, the concern being that an academic/corporate engine cannot successfully focus on common and aligned goals[1,16,17]. Finding a way past the inevitable doubts will be critical to improving patient treatment[17]. The good news is that for the first time it might actually be possible to know which medications will be truly effective for those patients receiving them, possibly resulting in less guess work and fewer negative side effects. As an example, it is clear that all stakeholders in the health care industry will need to work together to successfully navigate the new area of "personalized" medicine or pharmacogenomics[18].

THE VALUE PROPOSITION FOR CORPORATIONS THAT PARTNER IN BIOMEDICAL RESEARCH IS LESS CLEAR THAN IN HIGH-TECH

The ability to form an effective corporate consortium of partners to develop technology standards is deep in the history of some academic centers, but on close examination, happens largely within the engineering or materials science departments. These industries have historically managed to coalesce around the development of a specific technology (e.g., integrated circuits and automobiles), but such consortia applied to drug discovery and development are not readily observed in the biomedical industry[19].

In the engineering areas cited above, there was a "tipping point" at which the technology could only be developed by a collaborative effort because the patented technology required to move the industry to the next level was held by multiple players, making it necessary to pool resources to advance the technology[18]. Thus, each partner stood to benefit from the collaboration, and it was clear how the technology advancement would directly affect each company's product development and return on investment. In contrast, the high costs and risks associated with discovering and bringing a new drug to market and the potential financial rewards for doing so encourage pharmaceutical companies to retain, sequester, and control enabling intellectual property[20,21]. In the biomedical science community collaborative projects are more readily built around collecting and sharing potentially valuable information as opposed to developing a specific product. An example is the human genome sequencing effort and the identification of single nucleotide polymorphisms (or "SNPs", which are naturally occurring genetic variations in the human genome, some of which might correlate with disease risk, drug efficacy, drug side-effects, favorable or unfavorable prognosis, etc.). However, the immediate benefit of this information and how it will translate to commercial drugs and diagnostics is not yet clear. Thus, many medical centers struggle with how to define the basis of corporate relationships that expect clear outcomes related to commercial product development. In many ways it is often easier to align the goals in academic engineering departments with companies because they share a common applied focus, whereas biology mostly focuses on open inquiry, and medicine on outcome.

There is also a misconception that corporate alliances are beneficial solely because they provide financial support for research[1]. The truth is that most biotechnology companies do not have large discretionary sources of capital given the high costs of drug development, and even pharmaceutical companies do not have a business model that readily supports funding of academic research projects: most critical research is accomplished within the company and outside investments are usually reserved for in-licensing or purchasing potential therapeutic candidates. To be successful an alliance must hold mutual interest and high value for both participants In this context, corporate partners can offer capabilities and resources not present in academic environments, while academic investigators afford a broad knowledge of basic disease mechanisms and can be sources of biological specimens not available in any single company.

FORMING ALLIANCES IN AMCS HAS DISTINCT CHALLENGES

The art of forming alliances in an AMC poses some interesting challenges. For example, while alliances at a company are driven by strategic goals and implemented by teams of business development professionals, and are essential to the success of the company, at a medical center some investigators might not see the value in partnering, might be dissuaded by the differences in culture, or might prefer to control their own collaborations, which must be respected in an academic environment[22].

The organized units of medical centers often present a clear identity that is "easy" to match with prospective corporate partners. For example, centers usually specialize in specific diseases such as diabetes, cancer, or cardiovascular disease. Patient advocates, federal funding agencies, and donors mandate that these centers develop products or information that can be used to guide the treatment of patients and thus provide the driving force for partnering.

A possible strategy is to work with the directors of these centers to develop a portfolio that describes the resources, technologies, and know-how that are essential for a particular institute or center to advance their research effort, and with this information in hand to identify potential corporate partners that might satisfy these needs. Collecting this input is a first step in capturing the global resource needs of the campus and makes it easier to prioritize strategic efforts in developing alliances[23]. For example, if a number of campus institutes or centers often request materials or tools on an ad hoc basis from particular pharmaceutical companies, it is worth the campus's effort to work on master or template agreements with those companies to formalize the partnership and expedite the process for transferring the needed materials to the campus investigators.

As an example, at the UCSF Comprehensive Cancer Center many clinician scientists requested compounds from a pharmaceutical company for studies on an ad hoc basis that required protracted negotiation of a contract for the use of each compound. A decision was made to facilitate the interactions between UCSF and the company by removing the contractual barriers. An alliance manager at the Cancer Center working with the company, University of California Office of the President, the UCSF Offices of Technology Management and Industry Sponsored Contracts coordinated efforts to put a master agreement in place for investigator-initiated trials. The greater ease by which materials could be transferred from the company to UCSF became a driving force for the company to seek to broaden and formalize its working relationship with the Cancer Center. The company perceived that collaborative studies with UCSF would be easier and studies would happen on a quicker timescale.

As the AMC develops multiple template agreements with different pharmaceutical companies it becomes critical to develop a process by which the campus provides information to assure that the investigators involved in these collaborations understand the terms of the agreements so that there will be no conflicts should they decide to collaborate with more than one company. It is important that the investigators have freedom to collaborate with those companies they feel have the expertise or resources they need for their specific projects. A non-exclusive relationship with a number of companies will be more likely to meet the needs of campus investigators.

In discussions with multiple pharmaceutical companies and investigators at UCSF it is clear that both seek to develop best practices for more innovative research collaborations that would result in earlier academic input in to clinical trial design. One vision is to assemble formalized project teams that include members from the company and the AMC. These teams work together in a timely and efficient manner to accomplish a mutually beneficial goal that is critical to both parties. The formation of such teams allows each party to bring its core competency to the project, encourages sharing of key resources, and includes funding that might be difficult to obtain through federal sources. A challenge will be to provide the infrastructure to assure that project execution goes smoothly and that concerns or issues are communicated to all project team members. The project teams answer another AMC mission: to provide the opportunity for the investigators and their students to better understand the culture of large pharmaceutical or biotechnology companies. Such an understanding will hopefully lower the barrier to forming such alliances in the future.

DEVELOPING A CAMPUS CORPORATE ALLIANCE TEAM UNDER INNOVATIVE LEADERSHIP IS NECESSARY FOR SUCCESSFUL PARTNERING

Most AMCs do not have designated employees whose job is to lead the development of strategic alliances based on specific projects involving technology or materials acquisition. Rather, the initial engagement of a corporate partner in research collaboration is often the sole responsibility of the investigator, who is unlikely to be able to follow through and manage the administrative process required to successfully negotiate a collaborative agreement. Few investigators have the time (or skills) to do this job effectively, and most campus administrators specialize in only one aspect of the process and may be discouraged from (or not rewarded for) acting more globally because of operational constraints (e.g., territoriality).[22.]

In fact, at many AMCs the process for identifying potential partners, initiating the formation of strategic partnerships, establishing the optimum structure for the partnership, and negotiating the requisite legal agreements with the corporate partner is fragmented and occurs across different offices. Although some AMCs have excellent technology transfer offices, these individuals are expected to focus their efforts on “selling” inventions, and the business relationships they develop with the corporate sector are in the context of technology licensing. Thus, these office(s) are typically not encouraged to develop business relationships around the early stages of collaborative research. As a result, the AMC may fail to take advantage of its resources, and its success in partnering suffers accordingly. Moreover, there is an increased desire for companies to engage in strategic research partnerships reflecting a general trend for companies to move away from licensing arrangements and towards building partnerships.[24.]

On the other hand, most contract officers within AMCs that negotiate research and collaboration agreements for acquiring technology resources are commonly not trained to make science or business decisions and are not experts in intellectual property. Consequently, they lack the skills required to balance scientific and intellectual property risk against the potential benefits of a business opportunity.

Thus, although the intellectual property and contract officers might perform their specific duties well, they might lack context or perspective on the roles of these alliances in the AMC’s broad missions. Money and time are wasted on administrative bottlenecks that might be alleviated if the offices were integrated both functionally and philosophically under creative leadership, to make decisions as an integrated unit, driven by a common objective and value system. Some institutions are taking the step to adopt operational processes that combine these offices and also to develop databases to track corporate partnerships; however, these are only two of the many steps needed to form successful partnerships in the biomedical sciences. There are financial and scientific consequences for not implementing a process for promoting strategic business decisions within AMCs.

A serious consequence is that some senior investigators seeking to circumvent the campus blockade simply deny their interest in any intellectual property and encourage the university officers to accept inappropriate or unfavorable intellectual property terms from the partnership in order to get the deal done so the research can commence. As a result, the corporate partner might commercialize a lucrative invention without either the scientist or the university receiving fair consideration for its intellectual property.

AN EFFECTIVE CORPORATE ALLIANCE TEAM REQUIRES SCIENCE, BUSINESS AND ALLIANCE LEADERSHIP

To partner effectively, AMCs will require a leader or corporate alliance team with extensive business experience, solid strategic and opportunistic planning skills, first-hand knowledge of the biotechnology industry (its technology, needs, trends, and people), a wide network of connections in the corporate world, an understanding of biomedical research, knowledge of a wide range of technologies, and the skills to forge the right relationships and connect the "right" strategic partners. Within companies, the counterpart of this corporate alliance team is the business development group.

This type of leadership team must be able to move several partnerships along in parallel, and coordinate efforts across campus that have common goals, helping to leverage the value of existing resources. Optimally, a team member would be present at initial meetings between interested faculty and the prospective company partner, assuming a project manager role to assure that action items are completed, communications among partners are sustained and robust, and the partnership moves forward.

The group would have general knowledge of research programs, technology resources, people, and strategic goals across the campus and, as appropriate, would facilitate hand-off to other campus offices. As mentioned above, an effective facilitator not only has knowledge of industry trends and investigator needs, but also serves as a communicator, relationship builder, and project manager to assure follow-through on important initiatives, both internally and externally.

CORE FACILITY DIRECTORS PROVIDE INSTITUTIONAL DUE DILIGENCE

AMCs are creating an expanding network of high-technology research core facilities that offer access to a broad range of instrumentation and services, usually on a subsidized recharge basis, that lie beyond the scope of a single investigator. Campus core facility directors—the professional staff that operate these units—are the resident experts in these specific technologies and should advise the corporate alliance leadership team, rigorously evaluating the technology and suggesting the appropriate alliances to meet or exceed faculty needs. With the growing sophistication of the technologies, together with intense marketing by companies, few biomedical researchers will have experience, breadth, or time to critically evaluate the potential options.

Thus, core facilities can serve as effective interfaces between tool-based companies, AMCs, and individual investigators, with potential advantages for each. For companies, core facilities offer a single portal through which to negotiate supply costs, providing broader access without the need to market to individual researchers. For the institution, core facilities produce price negotiation leverage. For investigators, they open a stream of appropriate frontline technologies that may otherwise have remained inaccessible and perhaps even unknown. Moreover, facility directors provide a stable base of expertise for technology training and communication that would otherwise be missing in the highly dynamic environment of graduate students, clinical trainees, and postdoctoral fellows who populate academic laboratories. It is not surprising that many tool-based companies embrace the notion of centralizing their technologies in core facilities that serve an entire campus.

Corporate Alliances can Promote other AMC Missions

Perhaps the greatest challenge to achieving the four key missions of AMCs (healthcare, education, research, and dissemination of knowledge) is the potential for these missions to be conflicting or contradictory. Can trainees be put on the wards and still deliver the finest patient care? Can partnerships be built with corporations without sacrificing the open intellectual inquiry needed for education and research? Can the most insightful discoveries be made in laboratories powered by students?

To avoid such conflicts requires that each mission be approached thoughtfully and in a manner that takes the other three into consideration. In turn, this demands close interaction and cooperation between those with primary responsibilities for each mission. Although it is not practical to govern these functions from a common office, explicit responsibility for vigilance and oversight at the highest administrative levels is essential for proper integration. Successfully done, the execution of each mission could enhance the other three. For example, thoughtfully crafted research alliances could serve not only to move knowledge beyond academic walls, but also to deliver novel technologies into the research and health spheres that indeed bolster the bridge between them, to strengthen both the conceptual underpinnings and the practice of education, and to provide resources that can help support the whole institution.

Conclusion

Partnerships require time, effort, expertise, and management by a corporate alliance team that unites key personnel, functions, responsibilities, and resource capabilities now commonly spread across multiple campus units. Together, this group can build and capitalize on a working knowledge of internal and external resources and develop a rich functional business network for campus investigators that leverages institutional resources.

Successful alliances are driven by complementary needs of the partners, and the joint perception that meeting those needs would benefit each partner. The right team would couple business expertise, a sophisticated knowledge of research within the AMC, and a robust network of corporate contacts and interactions to complete the entire process from the initial science discussions to the business and intellectual property discussions, the actual contract negotiation, and the monitoring the performance of the partnership against mutually agreed-upon milestones. Operating within an integrated institutional context, the corporate alliance team can advance many key goals of modern AMCs.

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Giving It Away: Free Technology Transfer to the Irish SME Sector

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ABSTRACT

One of Europe's major weaknesses lies in its inferiority in terms of transforming the results of technological research and skills into innovations and competitive advantages. (European Commission, 1995, p. 8)

Technology transfer is a key aspect of economic development and research administration. These concerns are shared equally between academia and industry on both sides of the Atlantic. As technology is developed at a greater rate, concerns about the technology transfer will heighten. This article focuses on technology transfer in Ireland, particularly in the SME (Small and Medium size Enterprises, under 250 employees) sector. As the main Lisbon Objective has not been met in Europe ("Europe is to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion"), the authors suggest a better model of technology transfer applicable not only to Ireland and Europe, but with possibilities for the United States. Demonstrating the international dimensions of technology transfer, the article also provides an American perspective, demonstrating commonality of interest yet subtle differences.

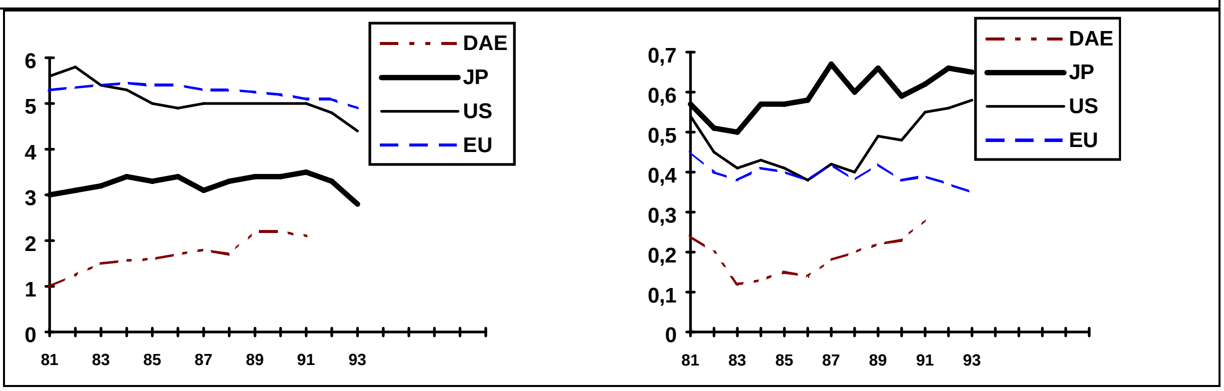
THE EUROPEAN UNION'S STRATEGIC OBJECTIVE FOR INNOVATION

Since the publication of the European Commission's Green Paper on Innovation, there has been general acknowledgment of the need to address the European Paradox, as outlined in Figure 1, in which EU scientific performance, as measured by number of scientific publications, was deemed superior to the that of the U.S. and Japan but technical performance, as measured by patents, was deemed inferior. Half a decade later, the European Council of Ministers proudly stated in Lisbon that they had reached a clearly identifiable measurable strategic objective. By this decade's end, Europe is "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" (Fontaine, 2000, p. 5).

Propensity of the EU, U.S., Japan and the DAE to produce results

a. Scientific performance (number of publications per million ecus, at 1987 U.S. prices, non-BERD)

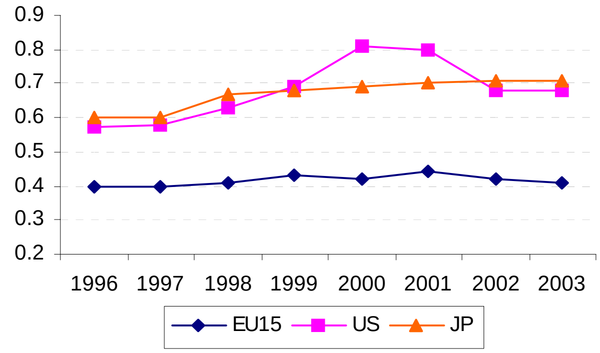
b. Technological performance (number of patents per million ecus, at 1987 U.S. prices, BERD)



Note: DAE=Developing Asian Economies; BERD=Business Enterprise Expenditure on R&D

Figure 1: First European Report on Science & Technology Indicators (European Commission, 1994)

For the past five years, very influential and powerful European Commission mechanisms, supported by national policies and directives, have driven wave after wave of initiatives, pushing research and enterprise with the aim of overtaking Europe's main trading partners in terms of effectively commercializing new knowledge. The European Commission's Enterprise and Industry Directorate has closely measured Europe's activity in this area, with its latest release in January 2005 of information on EU member country performance as compared to that of the other main trading blocks (European Commission, 2005a). Figure 2, in summarizing recent performance, shows that European performance has not been as good as might be expected. The recent review by The World Economic Forum concludes: "the EU as a whole receives lower scores than the US in seven out of eight Lisbon dimensions" (Blanke & Lopez-Carlos, 2004, p. 14). This has led to open acknowledgment by the highest levels of the Commission that the gap is actually widening. José Manuel Barroso, the EU President, bluntly states, "the EU is falling behind on its Lisbon objective of making Europe the most competitive economy in the world" (Barroso, 2005).



"The innovation gap between the US and the EU, as well as the gap between Japan and EU, still exist…. The EU innovation performance, as measured by the European Innovation Scoreboard, has been relatively constant since 1996, whereas the innovation performance in the US and Japan has further improved, thus widening the gap" (European Commission, 2005b).

Figure 2: Gap among the U.S., Japan, and the EU as Measured by the Summary Innovation Index (European Commission, 2005b)

For Europe, it is imperative that the Innovation Gap be effectively addressed. An obvious starting point is to postulate the reasons why the Lisbon Objective is not being met. Standard business analysis would conclude:

- The target was always too ambitious.
- Innovation has a long lead time and the time under review is too short to assess the investment impact.
- Like all cultures, the culture of innovation in Europe is tradition-bound and will take time to change.

Parenthetically, it should be noted that the use of quantifiable objectives in the field of innovation is a robust intellectual topic with differing viewpoints about its appropriateness, originally carried into mainstream management theory in the 1950s by Peter F. Drucker (*The Practice of Management*, 1955).

The system in place that aims to enable Europe "to become the most competitive and dynamic knowledge-based economy in the world" (Fontaine, 2005) ought to be questioned. By first analyzing weaknesses in the system, more efficient and effective alternatives may be identified.

The Current Support System for Achieving the Strategic Objective

In narrowing the gap, particular emphasis in Europe has been given to the SME sector, and especially to the knowledge-intensive high-technology field, due to U.S. statistics highlighting the ways in which SMEs have been among the main drivers of U.S. economic growth. Generating 60–80% of net new jobs in the U.S. annually, the SME sector produce 13 to 14 times more patents per employee than large firms (U.S. Small Business Administration, 2004). There is no doubt that SMEs in economic, social, and political terms are the most effective vehicles through which to implement effective knowledge-based innovation, with European SMEs accounting for 66% of private-sector employment and 50% of new jobs (BrainWin, 2004).

The most effective way to assess the system by which an SME seeks publicly funded assistance for innovation and research resources is to adopt the SME perspective and see what needs to be done. The starting point for this analysis, assuming an established strategic direction, is the identification of required technology and technological resources.

1. Range of Funding Programs

In Ireland, SMEs are eligible to apply for assistance across a wide range of initiatives that can involve the Third Level Sector (TLS) or other RTD (Research & Technical Development) providers. Considering that other public and private funding programs are available, even being simply aware of the resource options available becomes difficult to manage for time-constrained SMEs.

Funding programs include local initiatives, such as local enterprise boards; national initiatives, such as Science Foundation Ireland (SFI), Enterprise Ireland, and the Department of Education and Science; cross-border initiatives, such as Intertrade Ireland-Fusion and Intertrade Ireland-Innova; and EU Transnational initiatives such as Co-operative Research (CRAFT) and Collective Research. The authors are aware of more than 30 such programs (details are available by contacting the authors). Opportunities are plentiful.

2. Program-specific Details

Once the SME has become aware of a program offering research and innovation support, the next step requires the business to analyze the program, assess its suitability, and make a well thought-out application. This duty usually falls to a senior manager while he or she faces the day-to-day commercial challenges that attend developing a business. Each program has unique criteria that require deciphering:

- the application form (including fully grasping the program’s terms and conditions);
- the set of qualifying criteria;
- the funding levels available to the SME (and the funding inputs it may be required to contribute);
- eligible costs for the SME;
- deadline date (and time);
- success rate of applicants;
- reporting demands of the program;
- payment terms; and
- ownership of outputs.

All of this must be done before the real work starts and before any funding is received. In their analysis of SMEs and their problems in participating in European Research Programmes, Dawley and Hodgson (2003, p. 8) state that “by far the commonest (problem) concerned the administrative burden paced on the participating companies.”

3. Program-specific Details—An Example

Funding applications to each HTSF consume valuable senior management time. With rejection, the application will be totally in vain. It can be argued that no payment for failure to progress is normal in the commercial world but in the commercial world it is always the input effort required versus successful output possibilities that dictates where limited resources are applied. Taking CRAFT as an example (European Commission, 2005c), the EU's headline program to encourage SMEs to leverage the applied research capabilities of Third Level Institutes (TLI) and other RTD organizations, the input effort can be considerable. A call was issued on CORDIS on December 15, 2004 for horizontal research involving SMEs (European Commission, 2004). Table 1 lists the documentation that supported the call:

Table 1: Supporting Documentation

Document Type	**# Pages**
Call Details	5
Proposer's Guide	50
Work Package	14
Supporting Financial Guide	246
Total	**305**

All of this material is developed to assist in completion of the extensive application form. After this sizable input, the currently reported success rate for CRAFT submissions is 1:10 receiving assistance (European Commission, 2005d). The successful 10% are by no means guaranteed success in terms of commercial results.

Each and every program requires a unique approach, as do those that are not listed. It is not difficult to see how all of these programs place a considerable administrative burden on SMEs. One must ask, is this the most efficient and effective approach for European Small and Medium size Enterprises to follow in seeking to become more innovative as compared to their competitors in other trading blocks?

4. Design, Promotion, Implementation, and Management of Programs

The uniqueness of each program puts a heavy burden on those applying and a major burden on the European and national bodies that design, promote, and manage the actual program itself. Considerable skilled labor hours are spent developing the qualifying criteria, designing the application form, promoting the program, agreeing to the weighting in scoring applications, getting funding allocated, managing the receipt of applications, assessing applications, and managing the program. The more programs there are, the more complex the system management becomes, and the bigger the super-structure required to effectively manage its administration.

ALTERNATIVE SYSTEMS: LOOKING OUTSIDE THE BOX

Can those that promote technology transfer learn from other disciplines? Other fields have built up operational systems over time only to come under scrutiny and find the modus operandi of the sector fundamentally altered in a relatively short period. In their seminal study, Womack, Jones and Roos (1990) outlined how Toyota achieved twice the productivity of other car manufacturers while also delivering higher product quality. This was achieved by continually reviewing their operational systems with reference to the output they wished to achieve.

The techniques used by Toyota and emulated by many other large successful enterprises have led to sweeping changes in industries, from new technologies to retailing under the concepts of lean manufacturing and supply chain management. One of the fundamental tools used by enterprises looking to develop lean processes is benchmarking. Benchmarking seeks to improve the efficiency and effectiveness of a system through the study of other systems that face a similar output requirement to see if anything can be learned. For example, Xerox analyzed the warehousing procedures of L.L. Bean, the largest mail order firm in the U.S. (Letts, Ryan, & Grossman, 1999). What revolutionary new technique did they find? While Xerox organized its parts in all of its warehouses by product, L.L Bean placed the most frequently used items nearest the goods-out door and the less frequently used items further back. With such benchmarking exercises there is one common theme—the output focus. How can the provider do what he does better so that the user is not distracted by input issues and can better focus on his own output?

In terms of the Lisbon Objective, the question is, can Europe improve the output focus of its research while maintaining, if not even lowering, costs in terms of system development and management?

The Irish Example: As Xerox looked to L.L. Bean, Europe can look to Ireland

As Europe now looks to its gaps with its main trading partners in terms of innovation and knowledge-based economic development, so Ireland constantly stared at the widening economic gaps between itself and its European and North American neighbors.

To anyone who knew Ireland from the foundation of the state in 1923 to the 1950s, it was obvious that highly innovative economic action was required to narrow the widening gaps (Haughton, 2000). The country was being bled dry of the young and adventurous who went overseas to make their fame and fortune, returning with stories of streets paved with gold. This is not unlike Europe at present (European Commission, 2003), with top researchers being pulled to North America to drive the innovation and knowledge-based economic development activity so desperately sought in Europe—researchers who regale their impoverished colleagues back home with stories of resources, developments, and contacts that would whet the appetite of any sane postdoctoral researcher. Those with experience in Ireland 50 years ago would not, in their wildest dreams, have predicted the economic transformation that has happened. In getting to the main thesis of this paper it is worth understanding where Ireland has come from, highlighting along the way how it has got to where it is today.

A Brief Economic History of Ireland

Ireland's economic historic past does not contain aspects of industrialization. As Europe industrialized in the mid-1800s, the south of Ireland starved. Ireland's main export for the next 100 years started, as Ireland exported its people. There was no industry in the 26 counties that make up the Republic of Ireland. "In 1841, the population of Ireland was over three times that of Scotland and more than one-half that of England and Wales" (Cullen, 1987, p. 65). From that period the population of the southern counties went from an estimated 7.2 million in 1841

(Cullen, 1987), to an all-time recorded low of 2.8 million in 1961(Kennedy, Giblin, & McHugh, 1988, p. 70). With the continually dropping population (especially of those of working age) there was no dynamic to industrialize, yet the leaders of the time were only too aware of the need to do something radical, to stop the downward spiral, to narrow the gap.

After World War II, with an abundance of labor and no industry in the state and none likely to develop, the situation was hopeless. Something radical had to be done. Policy makers agreed that two areas had to be ring fenced for continual development if Ireland was to have any chance of getting out of its morass. These were education and industrial policy. Ireland, like the rest of Europe, always gave and continues to give, as Galbraith put it in *The Affluent Society* (1988), a position of primacy to education. Yet in this period, the commitment to education was increased at a time when it could least afford it.

At the same time the Economic Minister, Sean Lemass, was asked to identify the greatest "lack" in the Irish economy. Lemass's nonchalant response was 'good ideas' (O'Sullivan, 1994). Lemass started to get what he felt the nation needed with the development of the world's first duty-free shopping in 1947 in a glorified cow field in the west of Ireland—what is now Shannon Airport. Other initiatives followed, culminating in 1958 with the publication of "a remarkable study entitled Economic Development, organized and written with government approval by its new Secretary, T.K. Whitaker" (Kennedy, Giblin, & McHugh, 1988, p. 65). The preceding initiatives and the theme of this report not only transformed Ireland, but have been used by Rotterdam, Singapore, and in recent times, regions of China to guide economic development. The report gave the government of the day the impetus to develop the first industrial zone that charged no tax on profits on any export sales. In next to no time cow fields hanging to the edge of Europe became a centre for industrial activity, the likes of which Ireland had never seen before. The result was that some lucky workers were now able to remain at home, with the state gaining from taxes on wages and also from sub-contractors who supplied the exporters, and so the revenue benefits multiplied throughout the economy.

The tax-free status for export profits was spread nationwide. With accession to the EEC the policy's success accelerated. While it has been modified through EU regulatory requirements, it has undoubtedly been the cornerstone of Ireland's economic transformation. Akin to Ireland in the 1950s, Europe is beginning to find itself in an analogous situation in terms of the effective commercialization of research.

The Reality of the Policy

Understanding the concept of tax-free profits on export earnings is straightforward. It is important in a benchmarking analysis to look at the process that delivers the benefit. Can Europe learn from an analysis of the Irish process to benefit its commercialization of innovation policies?

The key to the success of the economic policies that started in Ireland in the 1950s, culminating in the Whitaker report, was the allocation of resources directly to companies, allowing the rest to follow. The costs in terms of bureaucracy for the applicant and for the administrator were low. No new programs needed to be invented, avoiding all of the inherent additional costs, not to mention the confusion in the mind of the applicants. It was one cap fits all, simple to manage centrally and requiring very few staff.

Ireland gave up its profit on products it was never going to manufacture. It did so in a very cost-efficient and revenue-effective manner. The benefit to Ireland is that the gap has gone and the economy is now out-performing that in many of those nations to whom it exported its labor over the years.

Ireland has achieved what Europe wishes to achieve by giving it away. Europe needs to give away knowledge-based commercializable innovations in areas in which the present system is failing. The piloting of just such a scheme is what is proposed here.

APPLICATION TO TECHNOLOGY TRANSFER

The Status Quo

Forfas, the Irish National Policy and Advisory Board for Enterprise, Trade, Science, Technology and Innovation, commissioned Technopolis to carry out a study of the capacity of Irish small- and medium-sized enterprises to absorb and use knowledge from outside of the firm. Technopolis published its findings in February 2005 (Forfas, 2005) and these findings are of relevance to the proposals put forward in this paper.

The absorptive capacity of a firm is defined as its ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends.

Positioned now in a rapidly expanding economy with a hitherto unimaginable investment in research, and with a plethora of world-class high-tech multinationals in residence, it would appear that the environment for the emergence of a growing indigenous high-calibre industry in Ireland could not be better. However, the absorptive capacity in the indigenous SME (Small to Medium Size Enterprise) sector to take advantage of this is questionable and its relationship in this regard with the Third Level Sector (TLS) is worth a proper examination.

In this section of the paper we focus on the degree to which technology in reality is emerging from the TLS, the degree to which it is being commercially utilized, and its significance in this rapidly changing environment. Of course, it is clearly only one means of influence on industrial innovation in the state. The point is that it is one that should, when the considerable investment being made is considered, be playing a more prominent role in this regard. According to the Forfas (2005) report, Ireland requires 'catching up' policies for absorptive capacity development, on the one hand, and must improve links that "were poor and relationships often characterized by mistrust" (Forfas, 2005, p. iii) with higher education, on the other. It must be stated, though, that Ireland is not unique as an EU member in this regard. Crowley, in his report (Crowley, 2004) on main sources and resources for innovation in the EU between 1998 and 2000 states that only 4% of all manufacturing industry and 6% of all service industry were used the Third Level Education Sector.

However, it's obvious as a member of the EU Community that Irish industry must improve its own absorptive capacity, including tapping its TLS source, if the growth of a technologically confident and innovative indigenous industry base is to come about. The Forfas report (2005) makes some very clear general and predictable recommendations that revolve around improvement of Irish industry's human capital, networking, organizational structures and procedures, learning processes, and systemization of tacit knowledge. It is also obvious that the

Third Level Sector needs to take drastic action to make potential commercial technology accessible to indigenous Irish industry. The objectives therefore can hardly be clearer. The key of course is to come up with a badly needed new approach to achieve them.

During the 'catch-up' process, research plays a limited role for the SME sector. Even in leading U.S. technology-based companies, well over half of all R&D projects are cancelled (Leonard-Barton & Doyle, 2004) and of those completed very few are highly profitable. The SME sector, therefore, must, in the main, dip with ease and effectively into existing resources as these stem from R&D results. Using this strategy, 'catch-up' countries have an opportunity to develop their economies more quickly than leader countries. In the Forfas survey (2005), the faster growing high-tech companies used more structured processes to capture and exploit innovation opportunities and more formally managed innovation.

Having said that, it was also reported in the same review that none of the businesses interviewed for the survey had supported the report and used the TLS for product or process innovation. Perhaps they should include this potential source of R&D results within whatever innovation management systems they are developing. Likewise, the TLS should examine its own systems for their ability to deliver such results in an efficient and realistic fashion. Underpinning all of this must be a national optimal innovation support system.

As discussed in the first section of this paper, the public funding bodies appear to be playing their role in incentivizing innovation but with a good deal of complexity. The hope is that the deployment of this support is optimal in terms of the TLS contribution to improving the innovation process and that the industrial sector as a good partner will increase its commitment.

Another useful source of information on the current major state financial commitment to innovation and its impact is the review of patent registration and technology transfer, published by Forfas (2004). This report shows that in support of the National Development Plan (2000–2006), the government committed €2.48 billion for "Research, Technological Development and Innovation" in order to underpin Ireland's objective to become a knowledge-based economy. The review, coming at the halfway stage of the plan, is useful in assessing the status of progress in RTDI (Research, Technological Development and Innovation). It is summarized below:

- **Patent activity**

The level in Ireland is particularly low—18th out of 28 OECD countries in terms of EPO appreciation and 18th out of 23 countries in U.S. patents granted. However, the growth rate of patent filing at the EPO from 1995–2000 for Ireland was the highest—most notably in computing and electronics.

- **Technology transfer**

There is a need, acknowledged by all stakeholders, to improve technology transfer (Forfas, 2004). Our focus here is on the transfers being affected by interaction between the Third Level Sector (TLS) and industry. As mentioned earlier, the interaction involving the SME sector is very low and reasons for this are given. It is stated from the industry/venture capital side that TLI expectations are unrealistic. For example, there is often an expectation by the TLI of a 15% equity undiluted in a spin-off company and the reversion of licenses in the event of company failure. Many venture capitalists view these demands as prohibitive. Other factors inhibiting such transactions, according to industry (Forfas, 2004), are:

- Underdeveloped technologies
- Unreasonable licensing terms
- Too complex/bureaucratic

A Way Forward

These perceptions reflect the poor performance in the level of technology transfer from the TLS to Irish industry. It is clear from the various reviews that whether it is due to poor supply management from the TLS or a poor absorptive capacity from the industry sector or a combination of both, a cultural mismatch exists.

As stated previously, Ireland is not unique in this regard. In a Royal Society of Chemistry review (Fyfe & Townsend, 2005) of spinouts from UK universities, similar inhibiting factors are uncovered and similar recommendations are made.

In the authors' opinion all of these recommendations are laudable and high on aspiration, but in most cases they just seem to be emphasizing more of the same thing. A culturally influenced "log-jam" is affecting really significant technology transfer when it comes to the SME sector. Only through a major lateral shift will a meaningful unblocking of the pipeline be realized: this thesis is being presented here as a specific recommendation.

The Lambert Review (2003), commissioned by the UK government, comments that universities may be setting too high a price on their Intellectual Property and that public funding for research and technology transfer activities is aimed at benefiting the economy as a whole rather than creating significant revenues for the universities.

The authors completely agree with this sentiment. Even the most successful U.S. universities obtain only a very small fraction of their income from revenues generated by commercialization of their research results (NHS, 1998). Typically, this might be 2% of research income. The real reason for the activity they acknowledge is to serve the public good. In the same report it is suggested that the development agencies should support those academic researchers who really can demonstrate strong demand from business for their research activities.

This preposition is acknowledged in this paper, where the authors propose a scheme to engineer its implementation with an essential assumption that it is pro bono publico. Linked with the evidence (SPRLI, 2001) that public funding does yield economic and social returns, it would appear that anything that can be done to induce a major increase in engagement between the sectors would greatly increase such benefits.

The added dimension of not inhibiting the researchers' creativity by imposing technological limitations will contribute to a significant innovative process and stimulate major discoveries mostly brought about by the free exchange of inter- and intra-disciplinary ideas. Recent reports from the CBI (2001), the Royal Society (2003), and the Patent Office (AURIL, 2002) confirm that these freedoms are important in academic creative and innovative research.

The output focus of the TLS is the business of providing education through whatever medium is appropriate. This includes, of course, education in the conduct of good research practice. The natural spinout from this research must be the opportunity for eventual commercial applications. The key word here is eventual and the focus must be on clearing all barriers between the two cultures in order to make this happen much more often and sooner than at present. In other words, leave the business of education, including academic research, to the academics and the business of commercializing research results to the industry and business sector. What remains to be accomplished, then, is the demolition of the inhibiting barricades and the fostering of a new culture and partnership between the TLS and industry.

The authors believe that the following should be piloted as a scheme to help in this demolition. The scheme relates to research results residing in the TLS and not to commissioned research or to research results emerging from collaborative projects between the TLS and industry. The schemes to assist these should continue with appropriate objective review. The advocated process is as follows, shown schematically in Figure 3:

- IP that is assessed as having potentially significant commercial value should be protected with support from the state-funding sector and ownership either left with the TLI (Third Level Institute)/University or put in the ownership of a central state body for administration and management of IP.

- Indigenous SMEs in the relevant sector are invited to separately discuss the protected technology with the TLI/University and the state funding body and prepare a plan for commercial development. The state funding body and the TLI agree on selection of the best candidate company to technically and commercially develop the technology.

- The company is given a royalty-free license to carry out this development within an agreed timeframe. This may require technical assistance from the TLI/University and financial and other assistance from the appropriate state funding body.

- If they do not accomplish this, either the project is dropped or discussed with the next candidate company or considered for licensing under commercial terms to larger enterprises and/or multi-national organizations.

- If the commercialization by the SME is successful, under audit from the state-funding agency, the agency then issues a certificate to that effect to the TLI, which becomes ‘negotiable currency’ in the TLI’s future applications for research funding.

- Within this scheme there could also be the provision to financially reward the researcher(s) involved.

- Companies that successfully innovate under this scheme will be given high priority in their future applications to commercialize research results from the TLS.

- Natural strategic alliances will emerge from this practice and the overall impact must be a significant increase in the real technology transfer of research results.

AN AMERICAN PERSPECTIVE

It is fair to say that many Americans daily immersed in issues of education, industry, technology transfer, business innovation, university-industry relationships, and overall economic competitiveness would agree with the concerns expressed in this paper. This extends to specific ideas in this paper, e.g., reducing administrative burdens associated with R&D programs, encouraging a culture of entrepreneurial ideas and activity, exporting as a means to grow a healthy and diverse national economy, improving technology transfer between university and industrial concerns, and increasing the absorptive capacity of small businesses in a global economy. Despite this commonality, the American economy differs from the Irish one insofar as the American economy is only starting to play catch-up in a global economy marked by constant shifts in technology, people, and capital.

This section of the paper, therefore, is concerned with providing several examples of how the U.S. government is concerned with the same topics as the Irish and European communities.

Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future

One example of this concern is the Committee on Prospering in a Global Economy of the 21st Century, located under the aegis of the National Academies in Washington, D.C. Senator Lamar Alexander and Senator Jeff Bingaman of the Committee on Energy and Natural Resources, with endorsement from Representatives Sherwood Boehlert and Bart Gordon of the House Committee on Science, requested the establishment of this committee. The committee was asked to respond to the following questions:

> What are the top 10 actions, in priority order, that federal policy-makers could take to enhance the science and technology enterprise so that the United States can successfully compete, prosper, and be secure in the global economy of the 21st Century? What strategy, with several concrete steps, could be used to implement each of those actions? (*Rising Above the Gathering Storm*, Executive Summary, p. 3).

The report notes at the beginning:

> Today, Americans are feeling the gradual and subtle effects of globalization that challenge the economic and strategic leadership that the United States has enjoyed since World War II. A substantial portion of our workforce finds itself in direct competition for jobs with lower-wage workers around the globe, and leading-edge scientific and engineering work is being accomplished in many parts of the world. Thanks to globalization, driven by modern communications and other advances, workers in virtually every sector must now face competitors who live just a mouse-click away in Ireland, Finland, China, India, or dozens of other nations whose economies are growing (*Rising Above the Gathering Storm*, Executive Summary, p. 3).

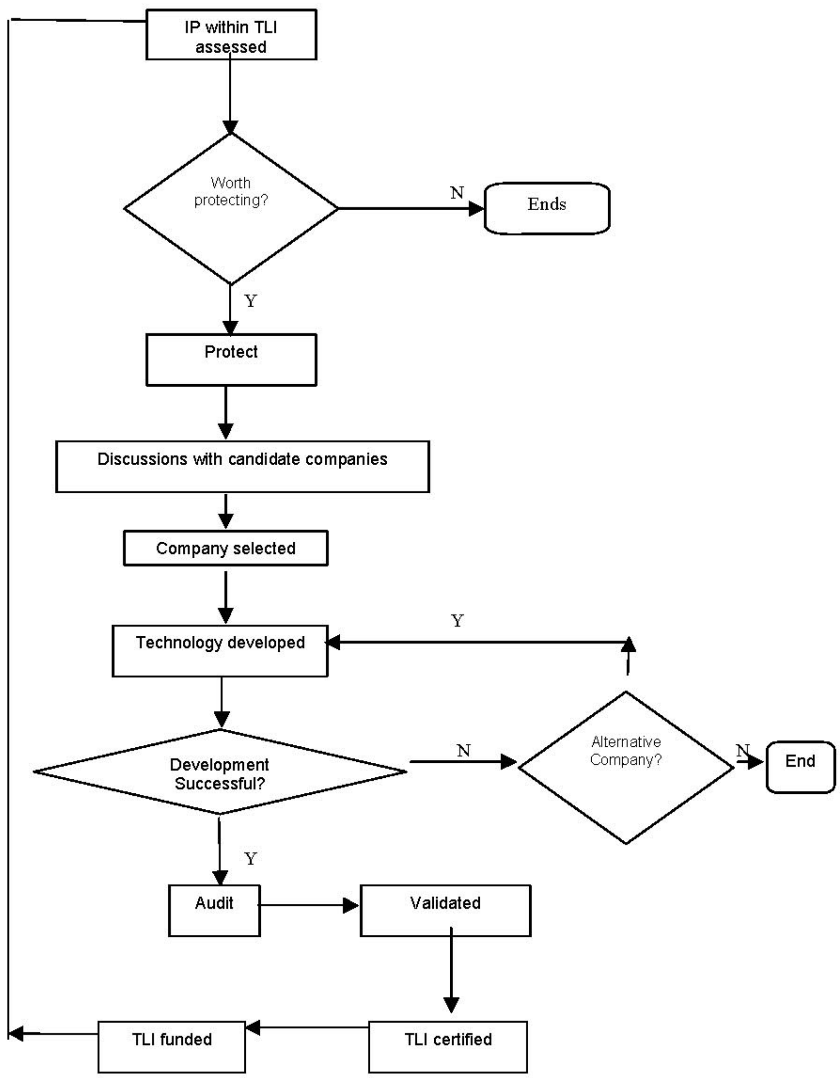


Figure 3: Flow Sheet for Technology Transfer

Among the recommendations are the following:

1. Sustain and strengthen the nation's traditional commitment to long-term basic research that has the potential to be transformational to maintain the flow of new ideas that fuel the economy, provide security, and enhance the quality of life.

2. Make the United States the most attractive setting in which to study and perform research so that we can develop, recruit, and retain the best and brightest students, scientists, and engineers from within the United States and throughout the world.

3. Ensure that the United States is the premier place in the world to innovate; invest in downstream activities such as manufacturing and marketing; and create high-paying jobs based on innovation by modernizing the patent system, realigning tax policies to encourage innovation, and ensuring affordable broadband access (*Rising Above the Gathering Storm*, Executive Summary, pp. 7–9).

Regarding the third recommendation, the Committee suggests the following action steps:

1. Enhance intellectual-property protection for the 21st-century global economy.
2. Enact a stronger research and development tax credit to encourage private investment in innovation.
3. Provide tax incentives for U.S.-based innovation.
4. Ensure ubiquitous broadband Internet access (*Rising Above the Gathering Storm*, Executive Summary, pp. 9–10).

The report does not advocate the use of tax-free status on export earnings as is used in Ireland, but equally recognizes the role and importance of tax structure on innovation and wealth development. The broad threads and ideas within this National Academies project are consistent with the hopes and initiatives of the Irish government. Attention will now turn to a second effort at the national level.

The University-Industry Partnership Project

The University-Industry Partnership Project is a joint effort of the Industrial Research Institute (IRI) and the National Council of University Research Administrators (NCURA), hosted by the Government-University-Industry Research Roundtable (GUIRR). GUIRR is located within the National Academies and the project has been in existence since August 2003.

This project is concerned with improving and enhancing university-industry partnerships, primarily at the research level but also more generally focusing on education. The project recognizes that education is a critical component not only in these relationships but also in the economic competitiveness of U.S. businesses in a global economy. Membership includes delegates from a broad depth of academia, industry, and the U.S. government. The corporate delegation includes large companies, small companies, companies from different sectors (manufacturing, pharmaceutical, aerospace, consumer products, chemicals, agricultural), bench researchers, research managers, legal counsel, and venture capitalists. Academia is represented by private universities, public universities, small and large universities; professors, students; sponsored research officers, vice presidents of research, licensing officers, and university entrepreneurs. The U.S. government has representatives from the National Institutes of Health (NIH), the National Science Foundation (NSF), the Department of Commerce, and the Office of Science and Technology Policy (OSTP, located within the Executive Office of the President).

The project primarily focuses on intellectual property and technology transfer, recognizing that those areas remain two of the most significant roadblocks to the commercialization of research. As a result, the project has developed three guiding principles around which better university-industry partnerships can be built:

1. A successful university-industry collaboration should support the mission of each partner. Any effort in conflict with the mission of either partner will ultimately fail.

2. Institutional practices and national resources should focus on fostering appropriate long-term partnerships between universities and industry.

3. Universities and industry should focus on the benefits to each party that will result from the collaborations by streamlining negotiations to ensure timely conduct of the research and the development of the research findings (University-Industry Partnership Project, Outreach PowerPoint Presentation, February 2006).

The University-Industry Partnership Project is having its National Summit in Washington, D.C. in April 2006. Senior research and R&D leaders have been invited from the various sectors represented in this project. This project also illustrates how U.S. concerns with technology transfer, research, and wealth development coincide with Irish concerns and initiatives.

CONCLUSION

What can be concluded from this paper? At a general level, it is clear that the Irish government is concerned with increasing the technology transfer prowess of TLIs/Universities, particularly in the area of absorptive capacity, and increasing relationships among the Irish government, TLI/Universities, and the private sector. This paper also illustrates that there is much commonality between the Irish and American governments, academia, and private sectors in these areas, and that ideas promulgated by one can be effectively modified and adopted by the other. More specific conclusions can be drawn with respect to the Irish experience:

1. There is plenty of documented evidence that the European SME sector lacks absorptive capacity for innovative technology that would help significantly in its growth. The growth of this sector is of course key to the EU economy.

2. There is a well-identified and long-standing cultural mismatch between the SME sector and the TLI/University sector that is likely to remain if a quantum jump in managing the interface more effectively is not made.

3. The relative amount of revenues coming into the TLI/University from the commercialization of research is insignificant even in the case of major U.S. players.

4. The efforts to manage this are quite costly and the end result very often havs a negative impact on the technology transfer process when it comes to the SME sector in Europe because of complex procedures and unrealistic expectations in relation to revenues.

5. Public funding throughout Europe, through the likes of the Framework Programmes, and at national government levels, through the Irish government's establishment of SFI, is putting considerable resources into encouraging research and innovation.

6. It is vital that much more effective technology transfer, particularly to the SME sector, must result sooner rather than later.

7. The authors are proposing a scheme that unlocks Intellectual Property from the TLI/University sector for easy access by SMEs and provides reasonably unfettered research funding to those participating who have a verified track record of technology transfer of value to this industry sector.

8. This scheme should be piloted in an Irish context and reviewed for potential application across Europe.

The challenge facing the Irish and American governments, institutions of higher education, and the private sectors is that the target is always moving, e.g., technology transfer, wealth creation, etc. The challenge facing both parties on both sides of the Atlantic is to maintain flexibility in a global economy that is constantly changing. These are two of the major challenges for the 21st century.

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Profile of a Research Administrator

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ABSTRACT

The purpose of this research was to determine the demographic characteristics of research administration professionals. This is the first time that empirical research characterizing the demographic profile of research administration professionals has been conducted. The population of respondents for the study included 277 research administrators based in the southeastern region of NCURA. Data were collected utilizing an Internet-based electronic survey instrument. A total of 230 usable surveys were collected (83% rate of return). The general profile of a research administrator is: female; 40–49 years of age; bachelor's degree; 6–10 years in the profession; earning between $40–50,000 annually; and came to the field by working at a university and transferring to a predominantly research administration position.

DELIMITATIONS AND LIMITATIONS

The research was delimited to research administrators based in the southeastern region of the United States as defined by the National Council of University Research Administrators (NCURA) (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, and Virginia). The sample population was selected because the southeastern region is the home region of Thomas J. Roberts, and is one of the largest NCURA regions (NCURA membership = 22%). It was anticipated that the response rate to the administered survey would likely yield the best results if the aforementioned population was utilized.

This study was limited due by the assumption that respondents would answer the survey questions honestly. Furthermore, the accuracy and currency of the records obtained from NCURA could not be verified and therefore could not be controlled.

INTRODUCTION

The university research mission has never been more important, yet little is known about a key figure in carrying out this mission: the research administrator. These administrators were not directly responsible for the advances in medicine, science, technology, and the social sciences that have resulted from university research, but they provided and managed the supportive conditions and organizational structures that were necessary for the research. A thorough search of the literature failed to reveal any research on the characteristics of university research administrators, including educational background, age, gender, and salary level. This lack of basic knowledge presents an obstacle to capacity-building and professional development efforts, including certification programs and other efforts to further professionalize the role. Yet, the quality of future university research is intertwined with the effectiveness of the research administrators.

The purpose of this research was to determine the demographic characteristics of research administration professionals. No previous empirical research has characterized the demographic profile of research administration professionals.

Formalization of the professional field of research administration was concurrent with the establishment of the National Council of University Research Administrators (NCURA) in 1959. Since this beginning, the number of research administrators has kept pace with the dramatic rise in external funding awarded to colleges and universities for research, the scale of research management on campuses, and the complicated legal and regulatory requirements associated with receiving external funding (Hansen & Moreland, 2004). Several educational certificate programs for research administrators have emerged over the past decade, beginning with the establishment of the Research Administrators Certification Council (RACC) in 1993 (Research Administration Certification Council, 2005), various internal educational programs on campuses throughout the country, and the first graduate certificate program in research administration management at Cleveland State University in 2005. However, no formal degree program in research administration or management has yet been offered, although interest in such a degree is evident from discussions held in various committee meetings and at national and regional conferences of research administration professionals. Universities that would otherwise consider offering a degree in research administration might well hesitate in the absence of basic information on the role. This article contributes a demographic profile of research administrators based on recently conducted survey research.

STATEMENT OF THE PROBLEM

No empirical research has characterized the demographic profile of research administration professionals. Despite increases in external support provided to colleges and universities for research, and associated increases in the number of people employed in the field, the profession lacks basic demographic profile information. It was not known how individuals initially became involved in the field of research administration. The purpose of this research was to begin to collect this data.

METHODOLOGY, POPULATION, AND SAMPLE

The population of respondents for this study included research administrators based in the southeastern region of NCURA. According to NCURA figures for 2005, 1,101 members were based in the southeastern region. Of these potential respondents, 134 were purposely selected because they had achieved certification through the Research Administrators Certification Council (RACC). Another 143 potential respondents were added to the sample by random selection from the NCURA database. The demographic data collected were from the study entitled, *Perceptions of Research Administrators on the Value of Certification* (Roberts, 2005). A more detailed description of the population and sample may be found in this study.

An Internet-based survey instrument, *Research Administrator Survey (RAS),* was developed to collect demographic data from research administrators. Following a satisfactory pilot study, the survey instrument was distributed to 277 potential respondents via an electronic mail notification. It included a link to an Internet site where the survey could be completed online. Each potential respondent was contacted by telephone or e-mail and notified that the study was in progress. Confirmation of contact information for all potential respondents was checked for accuracy and edited as necessary. Three electronic mail requests were followed by personal telephone calls to those who did not respond to the electronic mail requests.

RESULTS

A total of 230 usable surveys were returned, for a return rate of 83%. Analysis of the survey data revealed demographic information on research administrators in terms of gender, age, academic qualifications, experience in research administration, salary, and mode of entry into research administration. These characteristics are described in detail below.

Gender and Age

The professional field of research administration is dominated by women. The NCURA member database was accessed on February 9, 2005 and revealed that the Southeast Region had 1,101 members—79% women and 21% men (NCURA, 2005). In addition, the NCURA member profile database was accessed on February 10, 2006 and revealed that 183 members within the Southeast Region had completed member profiles (NCURA, 2006). According to the member profile, of those based in the Southeast Region of NCURA, 74% are female and 26% are male. The Society of Research Administrators International (2004) database was accessed on September 24, 2004 and revealed total membership of 3,619 people—73% women and 27% men.

A total of 76% of the respondents to the *RAS* were female and 24% were male. Respondents ranged in age from 20 to over 70. The majority of the respondents (91%) were between the ages of 30–59. Table 1 presents the demographic data pertaining to age and gender of respondents.

Table 1. Age of Respondents

Response	*N*	(%)	Male (%)	Female (%)
20–29	7	(3)	(43)	(57)
30–39	55	(24)	(22)	(78)
40–49	82	(36)	(24)	(76)
50–59	66	(29)	(20)	(80)
60–69	15	(7)	(33)	(67)
70 and above	1	(1)	(100)	(0)
Total	226	(100)		

Educational Level of Respondents

The educational level of respondents ranged from high school diploma or GED equivalent to doctorate. Over 70% of the respondents held a bachelor's or master's degree. Table 2 shows the educational level of respondents.

Table 2. Educational Level of Respondents

Response	*N*	(%)	Male (%)	Female (%)
Bachelor's Degree	89	(40)	(18)	(82)
Master's Degree	73	(32)	(30)	(70)
Some College Credit	29	(13)	(3)	(97)
Doctoral Degree	27	(12)	(52)	(48)
High School Diploma or GED Equivalent	5	(2)	(20)	(80)
Associate Degree	3	(1)	(0)	(100)
Total	226	(100)		

Classification of Position

Respondents were asked to identify the classification of their current position. The majority of respondents were either coordinators or directors. Table 3 illustrates the position classification of the respondents.

Table 3. Classification of Position

Response	*N*	(%)	Male (%)	Female (%)
Coordinator or Professional Staff	76	(36)	(18)	(82)
Director	58	(28)	(24)	(76)
Associate or Assistant Dean or Director	37	(18)	(32)	(68)
General Support Staff (Administrative Assistant/Secretarial)	24	(12)	(8)	(92)
Vice President (Full, Associate, Assistant)	10	(5)	(40)	(60)
Dean	3	(1)	(33)	(67)
Total	210	(100)		

Salary Ranges of Respondents

Salary ranges of respondents ranged from less than $30,000 annually to above $80,000 annually. Seventy-five percent (75%) of the respondents reported salaries between $30,000 and $70,000 annually. Table 4 provides details about the salary ranges of the respondents.

Table 4. Salary Ranges of Respondents

Response	*N*	(%)	Male (%)	Female (%)
Less than $30,000 annually	4	(2)	(0)	(100)
$30,000 to $40,000 annually	31	(14)	(16)	(84)
$40,001 to $50,000 annually	51	(23)	(18)	(82)
$50,001 to $60,000 annually	41	(19)	(24)	(76)
$60,001 to $70,000 annually	38	(17)	(29)	(71)
$70,001 to $80,000 annually	16	(7)	(12)	(88)
Above $80,000 annually	41	(18)	(37)	(63)
Total	222	(100)		

How Respondents Became Involved in Field of Research Administration

Respondents were asked how they initially became involved in the field of research administration. Table 5 provides a summary of their responses.

Table 5. How Respondents Initially Became Involved in Field of Research Administration

Response	*N**	(%)*
Worked in another area of the same organization and transferred to a predominantly research administration position	81	(36)
No related experience or expertise prior to becoming a research administrator	74	(33)
Worked for a government organization involved in grant related activity, but not specifically research administration	34	(15)
Worked for a not-for-profit organization involved in grant related activity, but not specifically research administration	23	(10)
Worked in the private sector involved in grant related activity, but not specifically research administration	14	(6)
Was a faculty member/professor and transferred to a predominantly research administration position	13	(6)
Was a student worker and offered a position after graduating	3	(1)
Worked at another university, but not directly in research administration	3	(1)
Grew up wanting to be a research administrator	1	(1)

**N* and (%) exceeds because respondents were permitted to check more than one answer.

DISCUSSION AND SUMMARY

The summary findings and discussion of the data collected pertaining to demographic profile information of research administrators are presented below.

The modal demographic profile of research administrators is as follows:

- female,
- bachelor's degree,
- 40–49 years of age,
- 6–10 years experience as research administrator, and
- $40–50,000 salary.

It is apparent that research administration is a field dominated by females. This is evidenced by the gender make-up of both NCURA and SRA databases. Between September 2004 and February 2006, three random inquiries were made of NCURA and SRA databases. Female membership ranged between 73%─79% and male membership ranged from 21%─27%. This was consistent with the respondents to the Research Administrator Survey as 76% were female and 24% male. Eight-nine percent (89%) of respondents to the Research Administrator Survey ranged in age from 30 to 59, and gender was consistent with the random NCURA and SRA database membership inquiries.

The role of research administrator is clearly dominated by women. As can be seen in the tables in this report, women outnumber men in every meaningful category of response. For example, there are at least twice as many women as men in each of the position classifications, with one exception. The exception is in the vice presidency, where women still dominate, but by a lesser ratio of 3:2. More men than women can only be found in one category of the educational level of respondents. Men have a slight edge over women at the doctoral degree level (52–48%).

RECOMMENDATIONS FOR FUTURE RESEARCH

Further research is suggested in the following areas:

1. It is recommended that a replication of the demographic section of the *Research Administrator Survey* be done in another region of the United States to further validate the results.
2. It is recommended that research be conducted to determine if curricula should be developed at the university level in research administration management.
3. It is recommended that the primary professional organizations in support of research administration engage in research to determine the number of people involved in the profession of research administration in order to provide an impetus for curriculum development and continuing adult education.

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pertaining to research administrators were collected as part of the research and were utilized as the basis of this article.

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