“Achilles Heel of University-Industry Partnerships”

Frank W. Hughes, Ph.D

The Boeing Company

University-industry partnerships are far from the ideal that the name might imply. Although most of these collaborations technically meet the definition of partnerships by being associations which have joint interests and benefits, the benefits to the participating parties are usually not equal because of a fundamental weakness in the way that the vast majority of these partnerships are set up. The principal weakness (e.g. the Achilles heel) of university-industry partnerships is that the basis of the terms and conditions for most of these relationships is the value system of the university. Little or no emphasis is placed on the values of industry. The value system used to generate the typical terms and conditions is the value system of those schools in the Research I category of the Carnegie Classification System. Not only are the terms and conditions based on the university value system, but also most existing university-industry partnerships are operated based on the needs of the university reward and recognition system with little or no emphasis placed on meeting the needs of industry. This fundamental weakness of not adequately accommodating the values and the needs of industry serves as the basis for most of the friction in university-industry partnerships and severely limits what can ultimately be accomplished in these collaborations.

Neither the university culture nor the culture of industry is completely right or completely wrong. These cultures are what they are, but they are undeniably different. Not understanding these cultural differences and not acknowledging and responding to them will continue to ensure that university-industry relationships consistently underperform their potential.

What are the principal values of the Research I university? Simply put, universities value the total amount of the revenues to the university from their research enterprise combined with the number of academic publications resulting from this research work.

Phrased another way, what is it that Research I universities want? They want problems to solve, money to cover all of the expenses of solving these problem, and complete autonomy, free of any restrictions, to make all of the decisions about the research process and the research direction. In addition, the universities then want ownership of the research results in order to be able to license them. The expected

licensee is often the sponsor who paid for the research in the first place. Attached to the license to use the research results is one special condition. The condition is that the university expects complete exoneration of any product liability resulting from the use of these results. Finally, the university wants to have open publication of all results except, of course, for whatever restrictions are necessary to protect their ownership interests.

What is it that companies want? Most companies want, and need, to have a higher education system which functions effectively to provide the following three basic outputs: 1) well-prepared new employees for a diverse workforce in a technical environment; 2) high quality continuing education for that workforce; and 3) effective and efficient research of value to their businesses. Expressed another way, companies want exposure to students as possible hires, access to new ideas, and educational opportunities for their workforce. Companies also want access to the ability to test and explore ideas as well as the ability to use these ideas and solutions in their products/services. Companies want relevant curriculum which produces graduates with the knowledge, skills, and attributes needed in their workplace, and they want faculty who understand and respond to the changing needs of the workplace.

The traditional types of university-industry partnership activities include research consortia, industrial advisory boards (both to departments and colleges and to research consortia), industrial affiliates programs, internship and co-op programs, and student design projects. Some problem areas of each of these traditional partnership activities will now be considered.

University-industry research consortia: Because consortia do not always involve a vendor company who is likely to use the end result of the research work, the development and transfer of the technology is slowed accordingly. Generally there are not enough small companies in the membership mix, usually because the fees demanded for participation are too large for these companies. Although the consortia usually includes an advisory board, the board generally has no meaningful power. Typically, advisory boards can only influence the research agenda at most. Advisory boards generally make no other binding decisions. Most advisory board meetings are show-and-tell in nature. Faculty aren't really asking for meaningful input from the funding members. Most consortia do not express a clear idea about what the proper balance point is between research and education in their operation. In most cases the true focus of these consortia is really on graduate education and faculty advancement and not on the utility of the research results. But, despite this seemingly educational focus, the principal measure of success for most consortia is usually growth, in terms of either dollars or the number of participating companies. Most consortia usually have government money involved. This involvement of public money works against the proprietary interests of almost all non-university participants. Most consortia usually involve a confusing pooling of public and private money without a proper understanding by all parties of the ramifications of this pooling. At least the ramifications of pooling public and private money do not seem to be discussed and never seem to be considered up front when forming consortia or when recruiting members. Finally, most consortia have ineffective ways to communicate the results to all parties.

Industrial advisory boards: In the case of advisory boards to departments and colleges, they are usually composed primarily of alumni. Alumni tend to be less critical than are non-alumni members. The focus of these boards is too often on generating new sources of revenue rather than on generating substantive advice. In most cases, nothing the board says is binding on either the department or college. The relationship of advisory boards to research consortia was addressed in the preceding paragraph.

Industrial affiliates programs: These programs go by a variety of names and are usually ways of raising money. The enticement to join is the offering of a few small “extras” to the sponsors in return for their money. As a generality, these programs are usually ways to create a pool of discretionary funds for the university program. Such types of funds are sometimes termed as slush funds. Most affiliates programs usually want to attract money which is free from the overhead burden of the university. As a result, these programs usually solicit gift money rather than contract money. In order to attract this money, however, these programs want to offer something in return. Offering a return for gift money is a mismatch of concepts. By getting a return for the money, the money is, by definition, not a gift and will not be allowed as a gift by the Internal Revenue Service (IRS). The IRS has a large, and important, say in determining what color of money is appropriate for companies to use in the support of affiliates programs.

Internship and co-op programs: These programs are more focused on students than on faculty. Internships and their benefits do not seem to be understood by most faculty. As a result, the students may not be well prepared to benefit fully from an internship. Additionally, the results of this experiential learning process may not be recognized at all back at the school despite the great benefits seen from internships by industry.

Student design projects: The biggest problem with student design projects is the lack of a common agreement between academia and industry on whether the proper emphasis is on the education of the student or the achievement of a useful outcome. As a result, what the proper outcomes of a project should be usually do not have a common understanding on the part of the faculty or of the students or of the project sponsor, if an external project sponsor is involved. Often overlooked by all parties is the fact that design projects are an academic requirement for the students. Student design projects should not be treated as another ploy for the faculty advisor to play researcher. Many faculty often don't know how to do all the things needed to address solution of the problem and are either uncomfortable or embarrassed to seek help from either other faculty or even from industry sponsors. Extra time spent by the faculty on helping students with their projects can be counted against the faculty member if it detracts from their working on their traditional promotion criteria. Finally, most universities use only the traditional, ineffective ways (such as publications in highly specialized journals, on-campus seminars with limited attendance, and presentations at specialized conferences) to communicate the results of the projects.

What can be done to address the principal weakness of university-industry partnerships? What can be done to improve things or to change things? The following closing paragraphs suggest some potential solutions.

The most important thing that can be done is to shift the focus of the partnerships from the needs of the faculty to the needs of the students. Nearly all of the items listed in this paper as characterizing the wants and needs of the university culture are driven by the needs and wants of the faculty, not of the students.

Universities must understand and respect the different colors of industry money. Additionally, they must understand the different colors and sources of university money as well as understand and respect the impacts of the way that university overhead charges are applied. Universities may need to generate different overhead rules than currently exist in order to encourage, not penalize, the desired behaviors and practices of both faculty and the providers of external funds

Universities need to start listening to their customers as well as listening to and understanding the criticisms of academia and the basis for these criticisms. Universities should not make rules or decisions or decide how to respond to the various criticisms of academia without getting feedback from their various customers as part of the decision-making and rule-making processes. Who are the customers? It's not just the students. All of the suppliers of funding for operating university programs are customers. These suppliers of funding include students and their parents, various combinations of federal, state, and local governments as well as public and private companies, foundations, and donors to support the schools.

Universities need to examine the recognition and reward structure and the impact of this structure on operating decisions which are made. Does the current heavy emphasis on research and on publication give the proper balance to the educational mission of the university and to the needs of the students? Is the guarantee of lifetime employment for a significant element of the university workforce still the best way for the university to manage its workforce? These are internal university business decisions, but all of the customers are greatly influenced by them. All funders of the university enterprise have both a right and an obligation to express their opinions on these business decisions.

Changes which will impact the university recognition and reward structure are being proposed to the Carnegie Classification System for universities. The published reason for the proposed changes is to get a better balance between research and education. The fact that changes are being proposed has only recently been announced. What the actual changes will be has still not been decided, but their very consideration has initiated a stir in universities which is sure to increase over the next few years. It is my opinion that these proposed changes will help more in the changing of the culture of universities than did the changing of the ABET accreditation criteria in the implementation of Engineering Criteria 2000.

Finally, both universities and industry need to start worrying about three more items that are important to both universities and industry. These are: the cost structure of higher education, the availability of access to higher education by diverse populations, and the pipeline for faculty (including their retention, their lifelong learning, and their career development).

In conclusion, I reiterate some of what I have stated earlier. Neither the university culture nor the culture of industry is completely right or completely wrong. But not understanding these cultural differences and not acknowledging and responding to them will continue to ensure that university-industry relationships consistently underperform their potential. While the United States still has the best system of higher education in the world, other universities throughout the world are competing to emulate this success. As many industries have learned the hard way, some of these competitors will be successful. American universities must not ignore this lesson.