A Formula for Success in Research Partnerships

Dale E. WITTMER
Southern Illinois University at Carbondale, Department of Mechanical Engineering and Energy Processes, Carbondale, IL 62901-6603, wittmer@engr.siu.edu, http://www.engr.siu.edu/mech/wittmer

KEYWORDS: *funding, research, partnership*

ABSTRACT: *The development of successful partnerships in research between two or more entities is thought of by many who are not successful as being based primarily on politics and connections and maybe just good luck. There is no ignoring that politics can play a large role in obtaining a grant from a company or agency, but it usually does not result in long-term successful partnerships. Realizing that the goals of each partner may differ significantly, successful partnerships can be realized with clear communication of the needs of each party and the implementation of a well thought out plan. Government agencies usually provide very clear goals for funding and the mechanism to obtain funding with the topical areas being somewhat broad, while industries often do not want to fund long-term projects without clear near-term impact and the research is usually proprietary. Universities are considered to be a "brain trust" because they have many resources that were once housed in the various industries, but their goals can depend upon many factors. Each academic unit at a University has an education mission but may not have a research mission, and most Faculty depend on funding and publications to obtain tenure and promotion.*

After over 25 years of research experience within government, industry and university environments, a formula for success in research partnerships involving those entities is offered in this presentation from the University perspective of an engineering Faculty. Use of the acronym, FUNDING, provides the basis for the suggested formula. The acronym, FUNDING, stands for flexibility, understanding, new (innovative), determination, integrity, networking and gratitude. Details of the "formula" and examples of the application of this philosophical approach will be presented and discussed.

1 INTRODUCTION

I was fortunate during my graduate education at the University of Illinois at Urbana-Champaign to work on projects that were funded by the U.S. Army Corp of Engineers, the Joint Services Electronics Program (U.S. Army, U.S. Navy and U.S. Air Force) and the U.S. Naval Research Laboratory. That early introduction to the proposal process and more importantly the reporting process has proven to be invaluable in my career. I was also involved in corporate sponsored research with my principal advisor, who was involved in proprietary materials research. Here I learned the value of delivering results rapidly and with a high degree of integrity, because without either the funding would have been immediately cancelled. Following my graduate education, I was employed by the U.S. Bureau of Mines, Tuscaloosa Research Center, to conduct research on processing of advanced ceramics and to support the coal gasification program. Both of these areas required interfacing with other research laboratories and industries that were sponsored by the government. Prior to joining the Faculty at Southern Illinois University (SIU), I was a program manager for GTE Products Corporation, charged with the process and prototype development of silicon nitride ceramics. This experience with corporate research provided an insight into how one might better interface with industries to develop collaborative research partnerships. Since joining the Faculty at SIU, I have been fortunate to be involved in several joint partnerships, with two very long lasting ones. I believe the reason for the longevity has been the willingness to adapt to the "FUNDING" philosophy.

2 FLEXIBILITY

I have observed that many Faculty are not flexible in their research. They are narrowly focused on only what interests them or is within their limited scope of expertise. They have not continued their education or are unwilling to branch off into uncharted waters.

I believe one must be flexible and adaptive to be able to address the needs of the funding agency or industrial partner. For example, my M.S. and Ph.D. degrees both dealt with processing of electronic ceramics and resulted in a patent. Had I been inflexible, I would have pursued only employment related to the electronic ceramics field and more specifically, piezoelectric ceramics. Since I had the desire to be more flexible in my continued education, I became involved in projects related to corrosion of metals in coal gasifiers and preparation of very fine non-oxide ceramic powders. The later area allowed me to interview for a job involving advanced non-oxide ceramics and continue my education in processing and manufacturing. This knowledge provided even more flexibility when the challenge arose to find research funding at SIU.

3 UNDERSTANDING

One must understand the problem in order to be part of the solution. One must also understand what is being addressed in a request for proposal and demonstrate this understanding to the agency. This may sound ludicrous but often the problem is described and the proposer then proposes to try to accomplish something that does not fit within the proposal. For example, the proposal may state that the problem is a lack of understanding of the failure mode of a composite material. The proposer's response is that they want to measure the heat transfer within the composite because that is their expertise. What is being requested in the RFP should be addressed in the terms used by the funding agency, thereby demonstrating an understanding. From a corporate viewpoint, problems are usually stated much clearer and are focused on near term results.

4 NEW (INNOVATIVE)

Although not a rigid requirement, a new approach to an old problem or an innovative approach will result in a greater degree of interest by a funding agency or industrial partner. We are fortunate today to have many investigative tools to examine old problems with our new tools. Advanced X-ray, analytical and imaging techniques allow us to develop information that was not available more than 25 years ago. The new field of nano-technology is another example of where innovative approaches are being used to develop and define various fields within the "nano" realm. Over 25 years ago our research involved the co-precipitation of oxides from organic solutions. The result was a nano-dispersion and the properties were enhanced due to the small particle size. This was a novel approach that was used to obtain funding from the Naval Research Laboratory. Today we would use the nano-technology terminology to demonstrate an innovative approach to the problem.

New also refers to not being afraid to try something new or innovative, even if the current thinking does not support your viewpoint. This has happened to me on several occasions, where I doubted the validity of an experiment but was not afraid to attempt to conduct it.

The current way of thinking in the mid to late1980's was that sintering of silicon nitride required a pressure of nitrogen over the parts. This was accomplished by use of sintering powders rich in silicon and a nitrogen overpressure. Both required special crucibles and expensive furnace equipment. I was asked by an industrial colleague what I thought about sintering silicon nitride in flowing nitrogen without the use of sintering powders. Having worked for several years in an industrial environment where pressure vessels and sintering powders were always used, my first response was to scoff at the idea. However, since I had never tried to accomplish what was being asked, my answer was conditional. That is, I explained that if we were to try to accomplish this task we should have a high liquid phase content in the material and used very high heating rates for only a short period of time. My colleague pressed me to assist his company in the sintering silicon nitride in his belt furnace at Centorr Vacuum Industries, Inc., Nashua, NH. No one was more surprised than me that the first material that was produced came out dense and clean with a minimum of weight loss. What followed was a proposal by SIU to DoE, through Oak Ridge National Laboratory, in collaboration with Centorr Vacuum Industries, Inc. This proposal was successfully funded and resulting in several commercial successes.

5 DETERMINATION

It is easy to get discouraged when one thinks they have a good idea or proposal but do not seem to generate much interest in it. Determination and enthusiasm for a project can help one sell it. Without determination, one is apt to give up and blame someone or something for not being funded. One can not

be easily discouraged or they will fall into this negativity trap. Industrial sponsors and funding agencies do not fund negativity. Desire and determination will often be the difference in hard financial times.

Another "D" is delivery. Agencies have reporting schedules and are required to report on a timely basis. Don't forget where most of the funding comes from and make reporting, what you do and when it is do, a routine. Your diligence to the schedule will pay dividends in tough times and your sponsors will remember. Several years ago, a colleague of mine went on sabbatical and while he was gone he asked one of his collaborators to take charge of the reporting. His colleague was continually late with reports and failed to submit the annual report by the deadline. The result was a loss of funding and not pleasant news to my colleague when he returned from sabbatical.

Delivery also refers to the product of the research. Companies have a much shorter timetable and their expectations from Faculty are often reserved. Sometimes they believe (and sometimes it is true) that Faculty want to create long term funding opportunities for their students and themselves. Delivery of agreed research tasks on a timely basis will usually lead to a corporate respect and lead to additional research opportunities. In government sponsored research early delivery on research tasks can also lead to additional funding opportunities. In one case, I had received ~$20,000 to do a feasibility study for a 12 month period, but in 5 months I had results which proved the feasibility of processing whisker reinforced composites by a process developed in my laboratory. I requested and received ~$105,000 for 12 additional months and later ~$261,000 for a three year period. This trust in our ability to deliver has resulted in over $2 million in follow-up grants in different research areas with the same agency; some with and without corporate partnership.

6 INTEGRITY

In industrial sponsored projects and when government and industry partnerships are developed, often secrecy or non-disclosure agreements are signed by all parties. It is a difficult position to be in when working on such a project, because often one has to report the results and maintaining the integrity of the program can be difficult when students are involved. We have been involved in several projects where the reporting of results was done only through the corporate sponsor and not through individual reports. On a joint program there must be trust by all parties that information will not be shared with the outside without the permission of all parties involved. One such program involved 10 companies, 2 universities, and the government agency. To my knowledge, the trust was upheld by all parties and a successful potential manufacturing technology was developed for the diesel engine industry, with application to the gas turbine and automotive industries, as well.

7 NETWORKING

Successful networking is the key to developing long-term relationships with industrial and government sponsors. This is often the most difficult task for the young researcher. Today's internet community though makes it easier than ever to track down potential networking contacts within industry and government funding agencies. Often the successful networker is accused of being funded because of who they know, but it is because they developed a network that they found the connections required to be successful. For some this is a difficult task because they are not forward individuals and have a hard time making self introductions. The internet has made this somewhat easier to identify people who might assist you in obtaining funding or developing relationships, but one still should desire to have face-to-face meetings with potential research partners.

For networking to be successful, one has to do a specific amount of preliminary work and not go to a funding agency or corporate partner empty handed. Take the time to work out a plan and present the plan, if you have difficulty in taking the lead, perhaps a colleague or institution representative can travel with you. Many institutions have faculty mentoring programs that can help or you can seek out someone within your institution that has a positive record of obtaining funding. Review your presentation with a colleague that will give you a frank appraisal of your presentation and be receptive to constructive criticism. Don't let your pride rob you of opportunity.

8 GRATUITY

Do not forget who your sponsors are and those who help make your project successful. Take every opportunity to acknowledge the support of funding agencies, industrial sponsors and colleagues who have

supported your projects. To forget to take these steps is not forgiven by many. With that, I would like to thank the National Science Foundation for supporting this meeting.

9 CONCLUSIONS

This presentation has offered a potential philosophical formula of success for obtaining and maintaining research partnerships between University, Industry and Government.

This formula is based on the acronym “FUNDING”. Try to be flexible in your approach, understanding of what is required, develop new or innovative approaches where warranted, stay determined and deliver on a timely basis, conduct your research with integrity, use networking as a means to get connected, and show gratitude to your funding agencies, research partner and those who assisted you in your endeavors.

ACKNOWLEGEMENTS

The author would like to acknowledge support by NSF under cooperative agreement number EC-9523372 and Dr. Peter Filip, Director of the Center for Advanced Friction Studies, SIU for providing this opportunity.