

FREE RADICALS

Hi, folks. It's been over a year since we last "talked." Hope you have been enjoying the beginning of the "real" new millennium. Yes, I'm stalling. This is because I am going to say something controversial. I am going to tell you that it is time for those research universities who haven't done so to get real. I am going to tell you that universities should, in addition to traditional emphasis on scholarship, aggressively and directly support graduate school R&D efforts focused on applications that are very likely to be commercialized. I can already hear the "purists" complaining that the traditional scholarly activities, which have been the *raison d'être* of universities, should not be contaminated this way. Hopefully, by the end this article, I will have convinced both the choir and the doubters that the mission of research universities should now include, when and where appropriate, being a virtual R&D partner for start-up companies.

Let's start with my summary view of universities. For hundreds of years the main functions of universities have been education, training, and, of course, scholarship, including discoveries in natural philosophy, *i.e.* science. About two decades ago, owing to severe global competition, high tech corporations began scaling back (downsizing) "blue sky" or "curiosity driven" research at their corporate R&D laboratories (*Ed. Note: See Woodall's Free Radicals, Summer 1999.*) As a result, breakthroughs and innovations in materials and devices were added to the list of functions of research universities.

Very recently, large corporations have dramatically increased their reliance on outsourcing product components. Along with this new environment there has been increased interest in integrating materials optimization into the overall functional design of products. This process is very evident in compo-

nents used in optical fiber communication systems. Because many of these components are made by recent start-up companies, this has produced a golden opportunity for research universities to partner with these companies and to participate in the rewards of technology realization, especially for niche market products, while still maintaining traditional academic purity.



Virtual R&D

by Jerry M. Woodall

Now, let's add to this the premise that one purpose, if not the main one, of universities is to prepare their graduates to be productive members of society. One way of doing this is to train some graduate students to be entrepreneurs via research and/or thesis projects whose scholarly topics could lead to commercially viable products. Ideally, this would be done with industrial partners and preferably, in my opinion, with start-up company partners.

To optimize both the graduate education process and chances of commercial success, we need to start this partnership at the beginning of the company start-up process! This is where things get both interesting and complicated. Let me be really clear about this. I am not talking about standard research contracts between companies and universities, in which

a university professor or groups of professors and students receive funding to do research within a well-defined work statement between the funding company (or agency) and the university. For this relationship, unless some other arrangement is made, any intellectual property (IP) generated by university employees over the course of

the contract is usually owned by the university.

Of course, the company funding the research can usually get a favorable licensing agreement to use this IP for its business needs. In other words this model is "work for hire" and is not a business partnership. Even though I am not concerned here with this kind of relationship, I would certainly encourage profes-

sors and universities to pursue this approach when it is appropriate.

Rather, the matter at hand is setting up a university/start-up company partnership while the company is still developing its specific business plans and is not sure what it wants to make or sell! This requires a new kind of relationship between the university and the company. It may require an agreement that whatever IP generated jointly between the company and university, the university's share of the IP be available as an exclusive license to the company at the beginning of the partnership.

This is the tricky part. First, both parties must be able to define and agree to the scope and boundaries of the area of work/discipline to be covered by this kind of partnership. For example, it might be work in the professor's research group on high speed electronics, with limitations that might include material classes, bandwidth ranges, etc. Then there are issues like conditions and duration for the exclusive license on university IP in the agreed-to work area. There is the issue

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of royalties, how much and the financial arrangement — equity versus cash or both. And then there are the funding arrangements/contracts for the professor's research group that cover only the agreed to work areas. This is tricky because both the university technology transfer office and its office of grants and contract must work together, which can be awkward because these offices usually report to separate lines of management. A further complication can result when the university in question is only a small part of a larger company network of collaborators. This can occur when the resource is mainly one or two professors and students with both special expertise and custom experimental equipment. In this case the university may be wary of making a priori deals on IP.

Finally, there are inevitable conflict of interest issues. For example, smart companies will want to offer founders or other stock options to both the lead professor and maybe to key students as

incentives to keep them committed to company R&D goals, and to ultimately hire these students into strategic positions in the company. It is quite likely that university administrators, especially at "traditional" universities, will have negative reactions to this approach. However, this need not be a show stopper because most research universities now have policies that include managing situations that involve conflict of interest. In this regard, it should be stressed that every company-university partnership R&D agreement must stipulate that if the research is part of a thesis project it must have a scholarly component, *e.g.* physics, materials science, that is sufficient to meet university thesis requirements and to be published in the open literature.

So, why bother? It may seem too complicated to even consider. In addition, some of my more purist colleagues argue that graduate school should be a broadening educational experience, whereas my approach is trying to make the graduate experience no different than actually working for the company.

My answer to this concern is simple.

My duty as a professor is to prepare my students to successfully enter the current job market, including becoming professors. Because a large part of this market includes many good jobs at "hot" start-up companies, I feel obligated to allow my students to gain the needed start-up business experience while they are students, in order to give them a competitive advantage in the job marketplace. At the same time, I provide and require academic excellence from my students. This sets my program apart from just working at a company either as an intern or as an employee.

As a final thought, this approach is not for all students or all universities. Traditional research funding must balance this type of relationship. However, those research universities that could but do not either allow or support this kind of partnership will ultimately fall behind those that do. I think it is clear that this kind of company-university R&D partnership will become an ever increasing component of future funding sources for university research. ■