Living Studies
in University-Industry Negotiations

Applications of the Guiding Principles for University-Industry Endeavors

Edited by James J. Casey, Jr. and Bruce M. Kramer

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FORWARD

This volume is a product of the University-Industry Partnership Project, a joint effort of the Industrial Research Institute and the National Council of University Research Administrators, hosted by the Government-University-Industry Research Roundtable of the National Academies.

The Project's membership, known as the University-Industry Congress, includes representatives of large companies, small companies, companies from different sectors (manufacturing, pharmaceutical, aerospace, information technology, consumer products, chemicals, and agricultural), bench researchers, research managers, legal counsel, and venture capitalists. The university delegation includes private universities, public universities, large and small universities, professors, students, sponsored research officers, vice presidents of research, legal counsel, licensing officers, and university entrepreneurs. The government participants include policymakers, research-program managers, and legal counsel drawn from several federal agencies. Representatives of nonprofit associations and research consortia also participated.

From their initial meeting in August 2003 to the concluding Summit on April 25, 2006, the 34 members of the University-Industry Congress thoughtfully examined frameworks for recasting the university-industry relationship. Of particular concern were the sometimes lengthy and contentious negotiations—typically involving intellectual-property ownership and licensing—that seemed endemic to reaching, or not reaching, collaborative agreements. Bringing their own experiences and those of their colleagues to the Congress's discussions, the members' goal was to define a new approach that would progressively minimize the adverse outcomes of intellectual-property negotiation and increasingly generate positive returns to university and industry partners alike. The expectation was that this approach would establish a virtuous cycle, expanding university-industry partnerships in ever-widening circles of activity, relevance, and influence.[1]

The University-Industry Congress ultimately established a set of three guiding principles that, if adhered to, should serve to ameliorate many of the difficulties experienced in partnerships generally and sponsored research agreements in particular. Like many deep truths, these "Guiding Principles for University-Industry Endeavors" seem entirely self-evident at first glance. But their power lies in their application. An analogy might be made with the United States Constitution, which exerts its authority not just in its words but especially in its application to specific facts and cases. These cases in turn influence the mindset and actions of the law-abiding public. Similarly, it will be the application of the Guiding Principles to day-to-day operations that reweaves the fabric of the university-industry partnership and creates a new and more durable cloth.

1. *For more information on the context of the University-Industry Congress and the current environment for collaboration, see James J. Casey, Jr., "Developing Harmonious University-Industry Partnerships," 30 Dayton Law Review 245-263 (2004). Also see Peter Kavanagh, Andy Maguire and James J. Casey, Jr., "Giving it Away: Free Technology Transfer to the Irish SME Sector," Research Management Review, 15:1 (Winter/Spring 2006).*

Thus the University-Industry Partnership has created this volume of individual case studies (here called "living studies"). Although a few involve licensing agreements, most of these living studies focus on challenges at the beginning of research partnerships, when sponsored research agreements are negotiated. The following Summary serves as an interpretive guide, showing how the Guiding Principles relate to each case.

SUMMARY: AN INTERPRETIVE GUIDE TO THE LIVING STUDIES

The Guiding Principles for University-Industry Endeavors number only three. Nevertheless, many experiences within the context of university-industry relationships evidence at least one of the three Principles, as illustrated below.

GUIDING PRINCIPLE #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.

The core mission of the university has three major components: the education of students, the creation of knowledge, and the dissemination of knowledge. The core mission of industry is to generate value for society by creating useful goods and services, providing financial returns for shareholders and other investors, and expanding the state of the art.

Because these missions are distinct, Guiding Principle #1 leads us to understand that universities and industries may have different intellectual-property (IP) interests across the basic-to-applied research continuum. Although thinking of this continuum as a rigid linear spectrum may be an oversimplification, "creation of knowledge" and "creation of new products and processes" are nevertheless distinct goals.[2] Indeed, as the living studies demonstrate, universities are generally more vigorous in protecting IP related to fundamental research, while corporate partners are typically concerned about IP related to new-product development. This partition of interests can generate templates for partnerships whereby IP is unequally shared in accordance with the unequal importance of the research at hand to each partner's mission.

A second implication of Guiding Principle #1 is that terms for IP ownership will vary, sometimes dramatically, in accordance with the corporate partner's business model—the method by which the company pursues its profit-generating mission. The wide variety of business models range from open standards/open source/open collaboration to sole ownership of blockbuster patents to long-held trade secrets not to be divulged through the patent process. It is this diversity of business models that is primarily responsible for the wide variety of approaches to IP ownership exhibited by corporate partners. By contrast, no such diversity exists in university-federal research agreements, where the nature of each side allows for standardized terms and conditions to be shared across some 90 institutions and 10 federal agencies (see the terms and conditions used by the Federal Demonstration Partnership at www.thefdp.org).

2. *Donald E. Stokes. 1997. Pasteur's Quadrant: Basic Science and Technological Innovation. Washington, DC: Brookings Institution Press.*

The "business model" of the university—by which it achieves its mission of creating and disseminating knowledge, and educating students—is publication. Even when all other rights are ceded, the right to publication in scholarly journals is the one most likely to be staunchly defended, and retained, by universities.

LIVING-STUDY ILLUSTRATIONS OF GUIDING PRINCIPLE #1

Partition of IP interest along Basic-to-Applied Continuum

As living studies LS-1 and LS-10 illustrate, the distinctions between the university and corporate missions make IP ownership—especially regarding the basic end of the basic-to-applied spectrum—a higher priority for universities than for companies. LS-1 illustrates why this is so: IP related to basic research is not only fundamental knowledge in itself but is likely to enable yet more basic research on the same theme. Thus universities are hesitant to eliminate an entire avenue of inquiry, forego future projects, and jeopardize professors' career trajectories for the sake of a single industrial partner.

Sometimes the need to enable more basic research is embedded in the very project being discussed. For example, a breakdown of negotiations in LS-2 occurred when the company could not accommodate the university's need to allow further basic research in and around the topic of negotiation, an imperative for the functioning of the university's collaborative research center. Where the research is so fundamental that product-relevant interests do not exist, the company can more easily forego the up-front establishment of IP rights. Therefore, the Fortune 500 company described in LS-11 was able to develop a special "Fast Track" type of agreement for such instances, reducing negotiating time from 4-6 months to 1.5 months.

Complementary to the universities' interests in IP related to fundamental research is the corporate interest in IP related to highly applied or developmental research. LS-10 was a solution to a multi-year negotiation in which the company absolutely could not or would not give up IP rights to its data, equipment, or other proprietary knowledge that was highly specialized to a specific already-developed product. In the end, the university gave up its rights instead. LS-12 recognizes this difference as well, giving the project-generated IP to the company but licensing it back to the university (royalty-free) for its own use in further fundamental research and publication. As summarized in LS-12, the IP interests of each partner and contractor were preserved so as to serve their future, but different, business interests in the technology. The university could publish and do future research using the Alpha robot, and the company retained rights to IP, thereby protecting future commercialization.

The relative importance of creating new knowledge within the overall mission varies among universities. An example is the master's-level institution in LS-4. Because educating students was the highest priority for this university, it was able to give all patent and copyrights to its strategic industry partners, retaining only the right to publish for educational purposes.

Projects that have both basic and highly applied components may need to be broken down into these distinct segments in order to assign IP rights correctly to each task. The expert negotiators in LS-1 were able to partition a nonnegotiable research project into three negotiable components: a human-subjects trial, a fee-for-service activity, and a sponsored fundamental research agreement. The IP rights of the university and corporate partner varied for each task.

In rare cases, the university may engage in a partnership that does not impinge on any of its fundamental missions: the project does not constitute basic research, does not involve the education of students, and will not result in publication. In this rare situation, the university may simply choose to give away all IP and publication interests, as exemplified by the ASESR program discussed in LS-10. The ASESR program is interesting in two additional respects: 1) it formally initiates a dialogue with the principal investigator to determine the scope of the project relative to the mission of the university (via the questions in the Risk Assessment Sheet); and 2) it constitutes a unique and workable solution for companies whose business model hinges on complete secrecy regarding proprietary data. But again, this solution is possible only because the work at hand does not impinge on the mission of the university (no fundamental or publishable findings).

Universities interested in utilizing a similar process would need to carefully evaluate the impacts on the institution, including the need to preserve tax-exempt status and avoid charges of unfair competition. In some cases, it may be prudent for the university to secure intellectual-property protection for an invention even if an income stream is not anticipated. In that way "blocking patents," which would restrict the ability of faculty to continue performing fundamental research in the field in question, could be avoided.

Variation in IP Interest According to the Business Model of the Corporate Partner

Each publicly owned company has a core mission of providing goods and services to customers and delivering value to shareholders and other investors. Success in the market helps sustain cooperation with universities and other partners. However, this mission is achieved via a wide variety of business models, which means that each new industry partner will likely approach IP rights differently from the last partner. For example, some companies—typically, pharmaceutical companies—rely on ironclad intellectual-property protection to secure future profits. A major drug discovery, if correctly protected, could yield income for many years. For this sector, the opportunity for exclusive ownership or exclusive use of the IP transcends virtually all other considerations.

At the other end of the spectrum, many information-technology (IT) companies operate on business models in which intellectual property has only limited viability. In a matter of months following a discovery, the entire IT industry may have switched to a new generation of technology, and the IP under discussion will have become obsolete. In addition, the products incorporating IT-related IP often have low profit margins and depend on hundreds of interlocking patents. Any given IT-related patent may therefore contribute only a small amount to the overall value of the product. Commercial success is achieved by being first to market, or by being the first to develop a technology that ultimately—through open access—becomes an industry standard. A nonexclusive, royalty-free license is the preferred model for this sector.

The reality of different corporate business models means there is no such thing as a one-size-fits-all model agreement, even for projects that are substantively similar.

Another variation is the ASESR program mentioned earlier. This reflects business models in which proprietary performance data play a central role in a company's value proposition.

Because different corporate business models demand different IP treatments, there is no such thing as a universal one-size-fits-all agreement, even for projects that are substantively similar. Indeed, an effort by the current University-Industry Congress to collect model agreements from multiple universities ended in the realization that every university had one, that they were all nearly identical, and that—in practice—none had served as anything more than a starting point for further negotiation. Master agreements (an agreement covering multiple projects with a single corporate partner) had more utility in that they were the output of, rather than the input to, negotiation. They therefore tended to be already tailored to the business interests of the specific corporate partner.

GUIDING PRINCIPLE #2

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

University-industry partnerships take a variety of forms, ranging from a single sponsored research project to ongoing joint participation in student education and career placement, cross-appointed board members, supportive advocacy in government circles, substantial unrestricted donations, and others. Moving from an initial, single research project to a long-term, multifaceted strategic partnership is not easy, but the living studies in this volume suggest ways in which universities and companies can do so while yielding a greater variety of benefits to both partners.

At the core of a long-term corporate-university partnership are strong personal relationships and extensive communication, both of which can benefit from dedicated strategies. For example, the harmonization of university licensing and sponsored research functions can prevent differing goals and messages from being transmitted to the same corporate partner. Another helpful tool is the forging of master agreements, which can codify long-term mutual understanding.

LIVING-STUDY ILLUSTRATIONS OF GUIDING PRINCIPLE #2

Fostering Interpersonal Relationships

❖ Relationships among Researchers

Because research partnerships contain so many inherent unknowns, they are not easily circumscribed by legal constructs. For this reason, research partnerships—much more so than other ownership or work arrangements—operate smoothly only when there is a high level of mutual trust, independent of legal documents. As stated in a report by the Business-Higher Education Forum (BHEF) from several years ago, "It [a partnership] heavily relies on the strength of personal relationships."[3]

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Fostering interpersonal relationships is a key element in an overall strategy of expanding university-industry collaborations. For example, it is often an existing personal relationship between the corporate and university researcher, rooted in common goals and mutual respect, that spawns a new sponsored-research project. This is a key lesson from LS-1, LS-3, and LS-14, among others. Loss of the key researcher from either side will typically terminate the collaboration, along with hopes of future collaborations.

❖ Relationships among Negotiators

LS-2 illustrates that collaborative partnerships also rely on the mutual trust and understanding built between negotiators. Injection of new personnel into an existing partnership or ongoing negotiation can derail a well-thought-out arrangement whose various details have been laboriously hammered out over months of dialogue (LS-2, LS-6). Indeed, the ability to reach mutual understanding is so vested in personal relationships that stalled negotiations can sometimes be revived by eliminating some personnel and replacing them with others (LS-6).

Personal relationships and prior experience can go a long way toward making negotiation possible. Where there is no prior interpersonal history between the negotiating parties, a reasonable substitute is a solid base of expertise born of experience on both sides. Such expertise can generate creative solutions to difficult

3. *Business-Higher Education Forum. 2001. Working Together, Creating Knowledge: The University-Industry Research Collaboration Initiative. Washington, DC: BHEF. p. 16.*

problems, and it also fosters mutual respect. For example, expertise led to the highly detailed but workable arrangement in the first agreement worked out between the parties in LS-2.

- Relationships within Each Organization

  The LS-2 case study illustrates that the personal relationships that need to be built are not always across the university-industry divide. Had the corporate lawyer understood the importance of the structure of the research arrangement (large collaborative center) to its ability to deliver patentable results, he might have been able to make the necessary tradeoff between the ability of the research to generate IP in the first place (fostered by multiple funding sources and open discussions between researchers) and the ability of the company to own whatever IP was generated. After all, it is not possible to own something if it is never created. But while the detailed understanding of how research yields its best results typically rests with the researchers, the responsibility for protecting IP arising from those results rests with legal counsel. That division of knowledge can lead to a divergence of strategy within the same institution.

  Such disconnects are not limited to researchers and legal counsel. Typically, there are several other components of each partner's organization—including operational departments (such as university technology-transfer offices and industry technology-licensing offices) and managers at the middle (director) and executive (vice-president or vice-chancellor) levels—that also have an interest in the negotiation. The challenge is to bring their varying interests into alignment with each other and with the overall strategy of the organization. LS-14 describes an example of a university that actually reorganized itself to achieve this end. The result was an almost 200-percent increase in industry-sponsored research within one year.

  Other approaches to achieving alignment might include systematic accumulation and dissemination of the knowledge needed to see beyond narrow intra-organizational interests. This knowledge is typically built up through direct experience, but it could be institutionalized through training and regular dialogues across the various organizational divides. Formalized approaches that initiate a dialogue between negotiators and principal investigators (such as the ASESR risk assessment sheet of case study LS-10) can minimize divergence of intent and execution. At a minimum, it is important to incorporate key perspectives into the negotiating team. For example, "Having negotiators with scientific backgrounds, and familiar with the ongoing work and project plan, is an advantage" (LS-3).

- Relationships among Higher-Level Administrators/Managers

  The experience of the University-Industry Congress suggests that moving the discussion up to the highest levels of both partners' organizations can meet almost any negotiation challenge. There, both the authority and the vision reside to make a judgment, across multiple business and strategic functions, that is in the best interests of the whole organization. Trade-offs can be made at this level—including new contract provisions, new negotiation processes, and special accommodations in overhead rate or publication policy—that cannot be made at lower levels.

Particularly interesting with regard to senior-level negotiations is LS-6, in which senior management met weekly to hammer out an important agreement between their organizations. These leaders removed and added key representatives from both sides until the personality and expertise "mixes" were right. This combination of senior management and A-teams was then able to forge ahead with an agreement that embodied both novel clauses (commitment not to sue) and novel processes (discussion of strategy and terms with high-level personnel prior to establishment of formal contract language). The result was the timely completion of an agreement whose outcome had been seriously in doubt.

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The challenge, of course, is how to build similar competency, perspective, and alignment in lower-level personnel that enable them to make the appropriate judgments and trade-offs. Frequently invoking the attention of senior management is only necessary in organizations whose cultures have not changed sufficiently to enable them to successfully negotiate agreements.

- Fostering Personal Relationships through Organizational Practices

  Personal relationships among researchers, negotiators, and upper-level administrators can be fostered or impeded by organizational practices. Making interpersonal skills a factor in hiring or promotion will encourage new collaborations and augment existing ones. And eliminating "difficult personalities" from negotiations may be a practical necessity in order to save important collaborations.

  Because relationships also tend to build over time, organizational strategies for personnel retention should be given as much forethought as strategies for recruiting and start-up packages. Creating events where researchers can readily intersect and interact (such as an alumni day, when former staff members can revisit their old academic department) should also be an asset in generating new collaborations. Professional mixing venues—for example, San Diego's Connect program that links entrepreneurs with useful resources—can prove helpful for managers and professionals seeking to find potential partners.[4] Finally, seeking federal dollars to support university-industry partnering efforts can give institutions the motivation to collaborate (LS-9).

- Communication, Communication, Communication

  Communication is a recurring theme throughout the living studies. According to LS-4, "The partnership can be maintained provided that both institutions continue to communicate. [This] communication in general has been very straightforward and honest." The importance of communication is also stressed in the BHEF report cited earlier, which identifies it as "the most critical management issue in a collaboration."[5]

4. *See www.connect.org.*

LS-3 suggests that communication practices can start being institutionalized by establishing "pre-specified points of formal contact and…frequent informal exchanges that keep the relationship 'real time.'…The key is to keep the communication between the parties clear, straightforward, organized, and honest."

LS-13 details the dismal outcome of poor communication. The university researcher conceived of the project as a mechanism for broad student support, but the company expected timely progress to coincide with market and production considerations.

This poor up-front communication of intent was compounded by missed or absent communication during the course of the project. When the university researcher structured the project as a time-unlimited exploratory piece of research for an inexperienced student, the project was doomed to failure with regard to the deliverables expectations of the corporate partner. At the same time, when the corporate partner set deadlines that were incompatible with the academic calendar, the project was doomed to failure with regard to educational expectations of the university partner. In this case, there was poor communication of intent, expectations, and progress.

Another issue that sometimes arises is a university and company holding divergent views of their roles as "partners." For example, a company may make the mistake of conceiving of the university as a "vendor." Some university faculty, on the other hand, may misperceive the corporate sponsor purely as a source of funds without commercial obligations or time pressures. Disparities in relationship expectations can lead to failure unless they are uncovered and addressed through sufficient communication during the negotiation phase.

❖ Harmonizing Licensing and Sponsored Research Operations

One way for universities to maximize the return on their partnerships with industry is to harmonize goals and strategies between licensing (technology transfer) and sponsored research operations. Because sponsored research brings in a little over twice the industry funding as licensing revenues, it is important not to inadvertently damage the former while pursing the latter.[6] Anecdotal input from University-Industry Congress delegates indicates that the difference would be even more dramatic if figures for net funding (income minus administrative and legal fees) could be compared.

As illustrated by LS-15, it is easy enough to kill the goose that lays the golden egg. This living study compares two different university approaches to IP and their consequences. One university, which had concluded a licensing package for a manufacturing process it developed, chose to add incremental technological improvements to that package without demanding an additional royalty. This approach encouraged the corporate partner to support $1.4 million in additional

5. *BHEF, op. cit., p. 25.*
6. *In fiscal year 2004, universities received $2.9 billion in sponsored research funding from industry, and $1.4 billion in licensing income. See Association of University Technology Managers. 2005. AUTM Licensing Survey: FY 2004, Survey Summary. Northbrook, Ill.: AUTM.*

research at the university. Meanwhile, the manufacturing process was successfully implemented, increasing the university's stream of licensing income.

A second university, which had developed another manufacturing process, demanded a higher-percentage royalty for improvements. Rather than support additional research at the university, the licensing company is working on improvements by itself and with other partners, retaining the faculty member who developed the process as a consultant. The consequences of not recognizing the symbiotic relationship between sponsored research and licensing has led one University-Industry Congress member to note, "Measuring tech-transfer success by licenses alone dooms tech transfer to failure."

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In order to cultivate more productive university-industry research partnerships, several universities with high levels of industry support (e.g., Georgia Tech, Stanford) have taken a holistic approach by putting the licensing and sponsored-research functions under common management and integrating their goals. The story of how another university realized an almost 200-percent increase in industry-sponsored research in under a year, also through co-location and harmonization, is detailed in LS-6 and LS-14.

A challenge with integrating sponsored research and licensing functions is the development of performance metrics that can uniformly apply to both functions. The 2001 BHEF report cited earlier addresses this question:

> Devising university-wide performance measurements that do not force the various offices to compete for credit can promote better coordination… At the University of Massachusetts, the performance of the Office of Strategic Technology Alliances is measured in several ways. One is revenue generated from industry, but others are the level of university-industry partnerships, the initiation of new faculty projects, and whether a company is visible on campus beyond recruiting efforts.[7]

❖ Establishing a Master Agreement

Once personal relationships, communication, and mutual experience are well established, a master agreement can be constructed. Developing a master agreement between a specific university and a specific company is often a milestone in moving a relationship from the tactical level to the strategic level.

The master agreement accomplishes several things simultaneously. First, it forces a strategic-level discussion to occur in which both sides must come to understand their own goals and those of their partner. This much-needed discussion sometimes never occurs in the context of single-project transactions.

7. *BHEF, op. cit., p. 77.*

Second, the crafting of such an agreement draws in the higher levels of both organizations, thereby investing the accommodations and options of the master agreement with the political cover and authority needed for them to occur. Lower-level contracting personnel acting on a transactional basis might not consider the same actions "doable."

Third, the master agreement can establish or reinforce communication channels—such as reporting expectations, personnel exchange options, and points of contact—needed for collaborations to run smoothly. In many projects, such channels already exist, formally or informally; the master agreement merely ensures they exist consistently. Establishing a master agreement serves much the same purpose as building a highway between two towns: while travel was always possible, an easier traverse will result in more frequent visits and exchanges. And, much like the arrival of a highway in a small town, the creation of a master agreement between two organizations can be a source of inspiration, causing both to feel as if they have finally "made it to the big time."

LS-4, LS-5, and LS-7 illustrate master agreements, each of which is distinct in the terms it applies to the partnership. For example, LS-4 gives away all university-generated IP while LS-5 provides multiple licensing and access options to the corporate partner. The master agreement described in LS-7 gives IP to the company as a default but retains exemptions in the case where the invention is the sole product of university research (i.e., no access to proprietary data or materials enabled the invention). It also gives licensing options to the university when the company declares no intent to license six months after project termination. All three living studies, however, share an interesting commonality: their satisfied, almost joyful, tone.

LS-8 describes an approach to formalizing a long-term partnership that is somewhat different from a master agreement. In this example, the collaboration progresses through a series of steps. Initially, the university needs to sign on to the company's standard Non-Disclosure Agreement in order for detailed technical discussions and negotiations to be initiated. If there is mutual interest in proceeding, specific research-and-development contracts are developed that define the work to be done, the money involved, timing, and legal relationships (involving data-protection, copyright, patent, publication, and indemnity clauses, for example). Then, if circumstances warrant, a task-order contract is concluded that covers the same ground as an R&D contract but is structured so that additional work and funding can be added at any time.

By contrast, LS-9 provides a note of caution. Master agreements are almost impossible to design if there are multiple parties to the agreement. In such a situation, there are likely to be too many unique requirements. Each potential pairing will not necessarily translate to other pairings.

GUIDING PRINCIPLE #3

Universities and industry should focus on the benefits to each party that will result from collaborations by streamlining negotiations to ensure timely conduct of the research and the development of the research findings.

A representative of one Fortune-500 company participating in the University-Industry Congress estimates that it takes an average of 153 days to get from the first draft of the research agreement to final signed copies. Proprietary data from two universities working in the University-Industry Congress suggest a somewhat rosier view—that 80 percent of contracts will be successfully negotiated within a 150-day timeframe. Of course, some university-industry negotiations take 18 months or longer, making university averages much longer than unversity medians.

Nevertheless, the goal of most companies (see LS-6) and universities is to conclude negotiations within one month. Negotiations of longer duration carry multiple risks: (1) the goal of the research can become moot, as technology passes it by or (for agricultural work) the growing season is missed; (2) key players can leave or retire; (3) funds (e.g., end-of-fiscal-year windfalls) can disappear; (4) the cost of negotiation can start to approach the money at stake in the agreement itself, at which point one or both parties may well walk away; and (5) the agony of the protracted experience can cause one partner to "swear off" the other for the duration of the careers of all those involved.

To avoid these unpleasant consequences, it behooves both sides to work toward streamlining negotiations. After all, the net return on collaboration is the sum of benefits gained and transaction costs avoided. The living studies suggest ways to begin to eliminate some of these transaction costs.

LIVING-STUDY ILLUSTRATIONS OF GUIDING PRINCIPLE #3

Recognition that Each Negotiation is Unique

It is evident from surveying all the case studies that each negotiation is unique. Not surprisingly, then, the process of passing a standardized agreement back and forth did not result in resolution for any of the cases illustrated here. This need to negotiate unique agreements requires approaches that can reach a workable result as rapidly as possible, including:

- Up-Front Assessment of Intent, Goals, and Expectations

  As described in LS-6, the "sponsored research interaction process" (SRIP)

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developed by the Bay Area Science and Innovation Consortium begins with high-level negotiations on intent, goals, and expectations. The process then moves toward a conceptual agreement, and only lastly results in draft contractual language. This represents one approach to realizing effective communication and organizational goal alignment, the importance of which is discussed above under Principle #2. For a complex agreement that would typically require 18-24 months of negotiation, SRIP was able to reduce the time-to-agreement to about two months.

The new "TurboNegotiator" tool being contemplated by the University-Industry Congress takes a similar approach, requiring both sides to complete a short survey of expectations, goals, and beliefs regarding the project at hand before proceeding to the selection of contractual language.

- Triage

  University-Industry Congress members, from their own data, estimate that about 97 percent of industry-sponsored research projects do not lead to money-generating IP at the end of the road. Knowing how to triage agreements into high/low probability of generating valuable IP, and showing more flexibility toward IP on the latter, may be the most prudent course of action. As one member of the University-Industry Congress quipped, "There are an awful lot of projects in which it would make more sense just to staple a lottery ticket to the agreement than it would to waste time on negotiating ownership and licensing rights."

  LS-10 and LS-11 show somewhat more considered approaches to sorting projects and then dealing with the ones that have low probability of generating valuable IP. The ability to triage different classes of agreements into those that require extensive IP negotiation and those that do not is a first step toward enabling faster turnaround times for agreements and establishing smoother relationships overall. Of course, for some projects the relevance of IP may be dictated by considerations outside of potential licensing revenues (considerations such as the need to continue research in a given area), in which case IP negotiations will not be entirely avoidable.

- Separation of Licensing and Research Negotiations

  As explained in more detail below, the goals of sponsored research and licensing operations need to be reconciled within a single, coherent, institutional framework. But in some negotiations, it may be possible to separate these interests as a function of time. For example, the industry "fast track" agreement of case study LS-11 delays all IP negotiations until the point of a university invention disclosure. Where feasible, this approach reduces time-to-agreement by about a factor of three. In a similar university-based approach, discussed in LS-16, licensing negotiations are initiated only when corporate revenues relevant to the invented technology pass a certain threshold. More important than reducing time-to-agreement, this approach enabled an agreement to be reached in the first place.

However, the separation of licensing and research negotiations might not be an attractive approach in all or even most cases. One or both partners might believe that the time and trouble of negotiating IP provisions at the outset is worthwhile in order to preserve the freedom to pursue other research directions and reduce future risks and uncertainties. As one University-Industry Congress participant put it, "We do not want to be worse off with regard to IP access at the end of a sponsored research project than if we had not done the project."

- Master Agreements

  A key benefit of a master agreement—a uniquely negotiated umbrella arrangement for two partners—is the reduction it can achieve in time-to-agreement. While the other benefits of master agreements are detailed under Guiding Principle #2, LS-7 additionally shows the streamlining effect they can have. For each research project, the master agreement described in LS-7 reduced the negotiation time from the typical 4-6 months to 3 days once the agreement was in place. A representative of the company described in LS-7 estimated that over the course of some 25-50 research projects per university, the totality of the time savings was "countless hours" on both sides.

- Training of Personnel

  The University-Industry Congress recognizes that the university-industry research relationship is often more complex than institutional personnel policies have traditionally been prepared to address. Hiring practices do not always seek out highly trained negotiators, despite one university's estimate that, in comparison to federally funded research agreements, about five times more effort was required, per dollar received, to negotiate those that are industry-funded. Staff who can reduce negotiation time will pay their own salary costs in reduced turnaround time.

  For new and existing personnel alike, more extensive training programs could familiarize them with the nuances of collaboration, particularly those aspects they would not typically be exposed to in their daily work environment. Nevertheless, missing in today's training choices are options that expose university and industry personnel to the points of view of "the other side" or to those of other parties in the "intellectual-property food chain" of the home institution.

  Collaboration is a complex terrain, and the ability to successfully navigate it depends on knowing that terrain and being willing to hold hands over the rough spots. But too date we have found no case studies on unique training programs with the "broader view," suggesting that a key initiative of national professional societies should be to develop some.

CONCLUSIONS

The three guiding principles, as general as they may seem on the surface, have deep implications for day-to-day management of the university-industry partnership. Guiding Principle #1 explains why interest in IP rights varies according to sector, with universities having more ownership interest at the basic end of the research spectrum and companies having more ownership interest at the highly applied/developmental end. The living studies demonstrate that agreements flow more easily if each partner can show flexibility in the area in which they are least interested.

Guiding Principle #1 also explains why model agreements may not work in many situations: very different business models are used to accomplish the objectives of companies, and the role of IP varies in each model. Agreements with universities have to accommodate those IP-treatment differences.

Finally, Guiding Principle #1 explains why some agreements become irrevocably stalled: when the agreement comes into conflict with the fundamental mission of each partner, it is literally a "non-starter."

Guiding Principle #2 provides insights on how to maximize the degree of university-industry collaboration. The living studies show that long-term partnerships occur primarily through development of personal relationships across all strategic levels of the partnership (researcher, negotiator, high-level administrator) and between levels. Communication is a direct enabler of such relationships, and it can be enhanced through institutionally encouraged informal (social) and formal (reporting) functions.

Guiding Principle #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.

Harmonization of goals and strategies between the research and licensing functions is important in preventing divergent communications between partners. Much dissonance is created, internally and externally, when the two functions seek separate outcomes with the same partner. Conversely, LS-14 demonstrates that implementing a unified approach dramatically increased collaboration opportunities, leading to a near tripling in research sponsored by industry. Finally, as communication paths, personal relationships, and a positive experience base expand, long-term partnerships can be further facilitated by execution of a master agreement between the two partners. While not the end point of a satisfactory relationship, such agreements tend to be major milestones.

Guiding Principle #3 emphasizes the streamlining of the negotiation process. It specifically addresses the common failure modes of negotiations that simply do not converge and may go on for years, thereby eroding the timeliness and relevance of any proposed collaboration.

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

The living studies included here demonstrate several approaches consistent with this principle. First, an up-front assessment of intent, goals, and expectations of both parties can dramatically reduce negotiation time in subsequent stages. Second, the ability to triage agreements into high/low probability of generating valuable IP can shunt some of the low-IP-interest projects into a quick, easy-to-execute agreement format in which the company or university takes a flexible approach to IP rights. Third, master agreements can be used not only to set mutually understood expectations but also to dramatically reduce transaction times for each project between frequent partners.

The one area suggested by Guiding Principle #3 for which neither the discussions of the University-Industry Congress nor the living studies yielded any innovative examples was the training of negotiators. While it was universally believed that the anguish of protracted negotiation could often be attributed to a lack of expertise on either or both sides, this has not yet resulted in concrete actions. Formal programs designed to "co-educate" industry and university negotiators on the viewpoints of the other, or to address a "whole system" viewpoint of collaboration, are decidedly missing from the national landscape. Such programs should be developed, possibly by professional associations.

Guiding Principle #3: Universities and industry should focus on the benefits to each party that will result from collaborations by streamlining negotiations to ensure timely conduct of the research and the development of the research findings.

The creation and dissemination of ideas that result from university-industry partnerships has always been an important component of U.S. innovation. Pursuit of the Guiding Principles in daily practice has the potential to create a harmonious national enterprise that can assure continued– and even expanded– local creation of new inventions.

Absent an efficient system for innovation in this country, we face an era where innovation may move elsewhere.[8] In a worst-case scenario, there may be little rationale for the continuation of the research university, or for government-sponsored research as a public good, or for the creation of jobs in local industry. Thus, addressing university-industry relations will be crucial to our future living standards, homeland security, and other national needs.

8. Committee on Science, Engineering, and Public Policy, "Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future," Washington, DC: National Academies Press, 2006.

LIVING STUDIES

LS-1. Nutraceuticals Company Collaboration with Single Researcher

- Structure, activities, and benefits

  The company
  The company produces "nutraceuticals"—botanical remedies using various parts of a specific plant. The company was interested in the work of one of the university's professors who has done a great deal of basic research on the benefit of the particular plant's extracts; he has also developed a methodology for establishing the efficacy and shelf life of products made from these extracts. The company hoped that the research would result in, among other things, a publication documenting product efficacy.

  The university research laboratory
  The university's investigator is a single researcher. His research is funded by a variety of companies who are interested in the benefit of this particular plant for treating certain diseases. He also has multiple individual consulting agreements, with this company as well as others. At the moment his lab has no federal funding, but he has had such funding in the past and hopes to have it again in the future.

  The researcher became interested in this particular product because it is specifically produced and marketed as a nutraceutical. He proposed to apply his analytical method to determine its potency, including shelf life and quality control, and to administer the product to human subjects to determine its impact. He would also conduct basic research in an attempt to identify the active ingredient conferring the health benefit.

- The opportunity

  The company
  Access to a widely recognized researcher with a proven track record in the science necessary for analyzing the product and testing its efficacy in human subjects. A positive finding would enhance the reputation of the product.

  The researcher
  Access to a novel product and funding to support his research.

- Risks and vulnerabilities

  The company
  The company is providing access to its crown jewel—the proprietary product and information about it. Because its sole business is based on the formulation of the product, which is protected as a trade secret, inadvertent release of the information would be damaging.

  Additionally, research might result in identification of the active ingredient, which could lead to a pharmaceutical being moved to market via the normal drug-

development process. The company might not be able to take on that role because of the expense of moving a pharmaceutical through the various stages of testing necessary for FDA approval. If someone else took the active-ingredient pharmaceutical to market, this could decrease the worth of the company's product in that the consuming public might prefer the more tested and perhaps prescribed product.

The university
Research involving the core product of a company is particularly risky. Results showing poor efficacy, revelations of substantial information about the product, or intellectual-property (IP) developments that would threaten the company's market often lead to severing of the relationship and legal actions such as attempts to block publications and patents.

❖ Underlying model

The collaboration was initially cast as human-subjects research, which was only one task of several. The university tried to move the entire project into a sponsored-research model, with standard provisions relating to IP (notice and an option to a license) and confidentiality (if disclosed in writing and marked confidential, information provided by the company is treated as confidential for a limited period of time). The company resisted, as it had an intense interest in protecting its trade secret and wanted to own any resulting IP.

Further discussion lead to the conclusion that three types of activities were connected with the project:

- Human-subjects trial. The protocol was researcher-driven, and it included a method for measuring efficacy that had previously been developed by the researcher and used in a variety of research projects.
- Fee for service. The researcher had the ability to measure such things as stability and the effects of different manufacturing techniques on the strength and efficacy of the product.
- Sponsored research agreement (SRA). The research would seek to identify the active ingredient.

❖ IP role and usage

As always, the company was concerned that it would have the ability to use the IP and protect the confidentiality of its product, while the university was concerned about impact on future research efforts and its right to publish.

In this case, however, there were certain likely IP outcomes that were important to the company but that would have little impact on the ability of the university researcher to continue this stream of research. For example, results from the human-subject trial and fee-for-service activity that would improve the specific product were of great interest to the company, with only a small risk to ongoing research. So if narrowly drafted, the university would likely agree to ownership of any resulting IP by the company.

On the other hand, the university would not likely agree to company ownership of improvements to the analytical methodology of the researcher, as this would negatively impact his future research using the methodology. Similarly, IP resulting from the SRA is of continuing interest to the researcher, so at most the university might offer the company an option to a royalty-bearing license to any invention or a royalty-free license to use the IP internally for research.

- Playbook

  This case illustrates that one size doesn't always fit all. Here the work involved a series of separate tasks, and the IP and confidentiality interests of the company and university varied with the task. By analyzing those tasks one by one, we have been able to make progress in negotiating solutions.

LS-2. Multi-investigator Center

- Structure, activities, and benefits

  The company
  Large heavy-manufacturing company.

  The university research laboratory
  Multi-investigator center, concentrating on an area of research of great interest and value to the company, traditionally supported by multiple grants from federal agencies and the private sector. The research interests of the center's investigators were structured to allow for significant leveraging of funds, equipment, and staff. In other words, the expectation was that funding, equipment, and staff would be shared among various projects involving related research.

- The opportunity

  The company
  Access to vital, cutting-edge researchers in a well-staffed and well-equipped facility that had been developed over many years with financial support from many sources.

  The university
  Access to company's specialized equipment, interaction with company personnel, and substantial funding.

- Risks and vulnerabilities

  The company
  Was the company receiving value from the research support, especially in terms of the resulting intellectual property (IP)?

  The university
  Could the university assure that no commingling of funds would occur, especially from federal sources, so that the company could have ownership of the IP? Even if the university could so assure, would this be a wise thing to do?

❖ Underlying model

Agreement number I. The parties each started with their respective standard research agreement. In the university agreement, the company received no right to IP; in the company agreement, the company and all its subsidiaries received a royalty-free license to any university invention from the research. After much good-faith negotiation, the resulting agreement provided for the company to receive notice of any university invention and an option to a license to be negotiated in good faith under reasonable commercial terms. The license could be non-exclusive or exclusive for a period of years. The company also could negotiate for an exclusive license to the university's rights under any joint invention. The university would be responsible for filing any patent.

Agreement number II. After five years of successful collaboration, the company's patent attorney informed the university that it wanted a new agreement that would vest ownership of all inventions in the company, with the university receiving a nonexclusive, royalty-free license for educational and research purposes. During negotiation, the university offered a nonexclusive royalty-free license with no up-front fee for a period of four years and an option to an exclusive license. For joint inventions, the university offered an option to an exclusive license to the university's interests and provided that if the company chose not to license the joint invention, the university could license the invention and would share royalties with the company.

Prolonged negotiations (including the most skilled negotiators at the university who understood the issues very well) failed to make progress with the company's patent attorney. He announced that he was advising his executives that "Given the substantial investment by [the company, it] should retain the intellectual-property right in any technology developed….[This] is accepted practice throughout the industry and is consistent with [the company's] aggressive intellectual-property strategy." Given the multi-investigator, highly leveraged status of the center, the university felt it was unable to give the IP to the company. As the negotiations unfolded it was clear that the company's program people had benefited from the collaboration and wanted it to continue.

Eventually, the university received a letter from the patent attorney indicating that the funding was to be switched from a scope-of-work contract to an unrestricted gift. This would save the company some money (no indirect costs), but meant that it could not establish the scope of the research or receive any intellectual-property benefits. The university made it very clear to the company what the results of the change would be, but the attorney carried the day—for a while.

Agreement number III. Recently the company has proposed entering into an agreement for scope-of-work research under the same general terms as Agreement I.

- IP Roles and usage

  The above history illustrates how individual players can play a critical role in advancing or impeding the formation of a contract. It's hard to believe that the IP was less important to the company in the work under Agreements I and III. Yet the relationship foundered over the unrelenting demand of the attorney that the company own the IP. Given the nature of the university's research facility, giving up ownership would have created a burden in terms of "walling off" the project. This would have been very hard (perhaps impossible) to do, quite labor-intensive, and not particularly good for a research team that thrives on collegiality and sharing.

- Playbook

  This case illustrates that the players in negotiations can make a major difference. If the negotiators are knowledgeable and don't draw lines in the sand, agreements can be worked out that are win-win. But if one party has a set position that is likely to be untenable to the other party, it's better to recognize the situation and call things off, thereby avoiding a waste of resources and good will. Sometimes we need to understand that our goals and interests are just not compatible, and that we should part friends and agree to reconnect if circumstances change.

LS-3. Research, Development, and Commercialization Agreement, Focused on a Specialty Market, Between a Large University and Pharmaceutical Company

- What we are doing

  This study involves a university technology-transfer group (which licenses inventions derived from the university research labs) and a pharmaceutical company ("Pharmaco") with research, development, and commercialization capabilities. Pharmaco has had a longstanding R&D and commercial presence in the particular specialty market, largely attributable to the success of the university-Pharmaco long-term collaboration that began in the early 1990s. The innovator is a professor at the university and a well-known leader in the field.

  The professor and Pharmaco have worked together under a sponsored-research relationship. Promising new compounds discovered in the professor's lab under the research collaboration are licensed, developed, and commercialized by Pharmaco. After initial approval, continued R&D investment by Pharmaco has expanded the clinical potential of the compounds. The professor's lab participates in this effort to expand the utility of the products and improve patient care.

  The long-term relationship between Pharmaco and the university has fostered an opportunity for Pharmaco to develop a leadership position in the specialty market, resulting in significant benefit to patients. For example, one product was initially offered only in an IV format, but as a result of continued clinical research and scholarship Pharmaco has developed, it will launch an oral form for patients in earlier stages of the disease.

The university has financially benefited from Pharmaco's product commercialization efforts. The professor has gained further positive professional visibility as a key innovator in the field, in part through the success of the products that resulted from the fruitful collaboration.

- The opportunity

  Because new scientific insight will drive innovative uses for Pharmaco's products, and help keep innovation as agile and efficient as possible, it is important for the company to continually access leading-edge science in the field.

  Expanded uses of the products, along with the discovery and development of new analogs, benefit the university by providing not only royalty income and research funding but also recognition as a leading institution in the biomedical science of this specialty disease market.

  The work is orchestrated, and the program's success is assured, through strong scientific and personal interactions between Pharmaco scientists and the university. If additional partnerships (with other entities) are needed to maintain a leading edge in this specialty space, one of the toughest challenges is how to successfully consummate them without disrupting the core Pharmaco-university relationship. The two parties maintain that they can meet this challenge to their mutual satisfaction.

- The underlying model

  The model used for the relationship is a fairly conventional license granted by the university to Pharmaco for rights to the products, but with continued collaboration between the two parties to expand the research and devise new uses for the products. In other words, the relationship is structured to allow a straightforward path for product commercialization while allowing for additional innovation to address medical needs in this specialty space that remain unmet. The critical success of the model rests on Pharmaco's and the university's sustained commitment to combatting this disease as well as to their constant fostering of a strong and productive relationship.

- How we navigate the interfaces

  This successful relationship has been marked by strong interactions and mutual respect between the scientists at each institution. Pharmaco demonstrates continued commitment to the field in advancing the product; the university remains productive and continues to innovate in this space.

  To facilitate the exchanges and maximize synergy, it is important to have pre-specified points of formal contact and to conduct frequent informal exchanges that keep the relationship "real time." It is best to keep the licensing interactions related to, but separate from, the basic scientific/product-development interactions. Having negotiators with scientific backgrounds, and familiar with the ongoing work and project plan, is an advantage. The key is to keep the communication between the parties clear, straightforward, organized, and honest. In addition, they should always respond to each other in a timely fashion. These factors seem to be a recipe for success, as the latest product form (oral) was just approved and will soon be available to address patients' needs.

LS-4. Master Consultant Agreement Between Master's-level Comprehensive University and a Fortune-500 Multinational Industrial Company

- What we are doing

  This study involves a master's-level comprehensive university and a large multinational Fortune-500 company that is the world's leading manufacturer of construction and mining equipment, diesel and natural gas engines, and industrial gas turbines. The university and the company's worldwide headquarters are located within several miles of each other. The university and company have an historical special relationship, covering not only sponsored research but stretching to Board of Trustees governance and gift-giving to the university's capital and annual campaigns. While the master consultant agreement was fully executed on May 14, 1993, the relationship between the university and company predates this agreement. The agreement contains a reduced facilities and administrative (F&A) off-campus rate for research done at the company, and this rate reflects the special relationship.

  The agreement provides an umbrella under which to conduct a variety of student-centered research projects involving company personnel and university faculty, students, and third parties hired by the university. These projects generally come from the College of Business Administration and the College of Engineering, although the agreement makes no such limitation. Each project is given a consecutively numbered exhibit number, and the terms and conditions of the agreement apply to these projects, which are generally conducted at company facilities. (A "standard research agreement" would govern larger scale faculty-oriented research projects.)

  The actual agreement has many similarities with a standard research agreement, however, including provisions for confidential information, intellectual property, termination, indemnification/liability, and choice of law.

  This agreement allows for a long-term relationship whereby students (under the supervision of faculty) gain valuable industrial experience to supplement their classroom education, while the company gains from the expertise of university faculty and students. That is, the university's educational objectives and the company's strategic goals are both assisted by this partnership. This is the true essence of a win-win partnership and a primary goal of the University-Industry Partnership Project.

- The opportunity

  This relationship reflects the classical reasons why universities and companies collaborate. The company has access to students and faculty to advance its research agenda, and students and faculty gain valuable experience by working with an international Fortune 500 company. For a master's-level institution of higher education, this partnership is quite significant.

- Risks and vulnerabilities

  While there is always risk and vulnerability when it comes to university-industry partnerships, this relationship has historically shown little risk and vulnerability. On occasion, a project may be cancelled because of market conditions or financial circumstances at the company. But in general the individual projects go forward as planned.

- Underlying model

  This agreement and partnership reflect a classic master-agreement model, by which individual projects are governed by the agreement's terms and conditions. As the agreement has no end date, it reflects a long-term commitment by each party to the partnership. Additional critical success factors include the continuing commitment by university and company leadership to this partnership and the continued commitment by the company to remain heavily involved in the local community.

- IP role and usage

  Intellectual property generated under this agreement is generally assigned to the company. This includes copyrights on any works of authorship and patents for any inventions. The university retains a right to publish for educational purposes, after consultation with and approval by the company.

- How we navigate the interfaces

  There is a strong record of historical partnership between these two institutions. Their significant mutual interaction is reflected by this agreement and a regional initiative—a collaborative in which the university and company are anchor organizations—that is under way. This partnership can be maintained, provided that both institutions continue to communicate well both at the technical and administrative levels. So far, communication in general has been very straightforward and honest; to date there have not been any major problem areas that needed addressing.

  The lesson to be learned from this partnership is that communication and mutual understanding are critical, particularly in situations like this—where the institutions are located close to each other and they are significant players in the local community. Another critical factor is the buy-in and consent of senior administration; the master agreement in this case was negotiated at the highest level of each institution.

LS-5. Master Sponsored Research Agreement

- What we are doing

  The university is a public doctorate-granting research institution. The company is a Fortune 500 firm that is a world leader in printing, imaging, and computing systems. The company and the university executed a master sponsored-research agreement (MSRA) in 1997, and the relationship between them has been growing and evolving ever since.

The MSRA provides an umbrella under which various sponsored-research projects are conducted. These activities are collaborative in nature, are strongly multidisciplinary, and often involve multiple university faculty and students as well as company researchers and engineers. The MSRA includes provisions for publication rights, project management, and the handling of intellectual property (IP) and confidential information.

The company and the university have grown their partnership into a long-term strategic relationship, and the MSRA has contributed to achieving mutually beneficial outcomes, especially regarding the education of students and the creation and dissemination of knowledge. Research is conducted by Ph.D. or master's students and all activities lead directly or indirectly to high-quality dissertations, theses, and conference and journal publications. Twenty-two refereed journal articles, 89 conference publications, 11 Ph.D. dissertations, 6 master's theses, and 2 book chapters have resulted to date.

❖ Underlying model

The underlying model is the long-term strategic relationship itself. Collaborations between the university researchers and their company counterparts are activities that occur within the framework of this relationship, and each collaborative activity generates projects for execution. Note that this is different from the traditional approach, which focuses on the transactional aspects of isolated projects and where a project that "goes south" can drag the whole relationship down with it.

The foundations of this long-term relationship are based on several factors. First, the company respects the academic mission of the university—education and the advancement of research to create knowledge—and the university respects the commercial mission of the company. Second, the relationship is built on trust and shared values and a common desire to have the collaborative research make a contribution to society. Third, the company and the university approach the relationship as equal partners rather than with a one-up/one-down attitude. Fourth, both the company and the university are willing to contribute to each other's success and well-being, and there is a commitment to each other that goes beyond what is in formal agreements. Fifth, projects may come and go over time, but continuity is held at the level of the long-term strategic relationship—no individual project is more important than the relationship. Sixth, the focus is on students and how the research helps to educate them–any project not aligned with this objective would not go forward.

This long-term strategic relationship model is supported by the MSRA. Prior to its execution, the approach of sponsored-research agreements for individual projects had been collapsing. It was taking too long to execute an SRA (research was often well underway or even nearly completed before an agreement was in place) and too expensive (sponsors were unable to justify paying in advance for licensing rights to IP that might never come into existence).

The company's and the university's mutual goal is collaboration. Having the MSRA in place allows that focus, as the starting of new projects and managing existing projects is done quickly and easily. These research collaborations are enabled through the support of graduate students and faculty members, who benefit from a commensurate flow of research funds, including overhead, rather than a royalty and licensing income stream. When the company desires to license IP, it can choose from among several options specified in the MSRA. One such option, for example, is an exclusive license at a minimal cost. The aim is that the outcomes of these collaborations be mutually beneficial to the company sponsors and the university students and faculty members.

- The opportunity

  There is an identifiable intersection of the company's and the university's interests: the advancement of printing is the unifying theme of the research. Close collaboration between the university researchers and the company sponsors assures relevance of the work to specific sponsor needs and its appropriateness to the broader research community—the research thus results in high-quality conference and journal publications that advance the state of the field. The students benefit from teamwork, learn customer focus, develop good communications skills, and gain valuable industrial experience. Graduates of this program are highly sought by leading companies in the printing and imaging industry.

- Risks and vulnerabilities

  Organizations can change, thereby introducing new challenges in a relationship. For example, the company recently formed a technology-licensing board and established guidelines for university agreements. This complicated the renewal of the MSRA—each side wanted to make incremental changes—but the senior business and academic leaders prevailed and the end result was to keep the MSRA as is.

  Additional significant elements of risk are changes in strategic direction or financial circumstances, which can result in premature termination of projects, leaving graduate students stranded in mid-stream without support to complete dissertation or thesis research. Such changes need to be carefully managed to avoid damaging the relationship. Also, research projects occasionally end up on the critical path to product release, which can be temporarily incompatible with the academic schedule and educational goals.

- IP role and usage

  The company and the university view intellectual property as only one of several valuable outcomes of their joint activities. These collaborative efforts have resulted in a huge amount of mutually beneficial work, with only a small percentage being IP-related. Licensed IP is one of the tangible benefits of the research, however, and the partners' mutual perspective is that IP should enhance the relationship, accelerate mutual collaborative efforts, and be generative in its ability to catalyze further interactions.

Intellectual property generated under the MSRA is owned using a "yours, mine, and ours" approach. The company is assured access to the IP at a modest cost that is known beforehand and at a level of exclusivity that the company may choose. The university retains the right to publish, subject to a brief review by the company for confidential information and IP content. If the publication contains IP on which the company desires to file a patent application, the university will delay publication for a reasonable period to allow the filing to be completed.

❖ Playbook: How to navigate the interfaces

The MSRA was negotiated and signed in less than one month. Both the company and the university were strongly motivated to work together. Also, they did not want to have IP negotiations become a barrier to collaboration.

The MSRA established an explicit framework for managing expectations and actions within the relationship, providing for periodic project reviews, and specifying how confidential information is handled, how publications are reviewed, and how potential IP is identified. Students and faculty members who agree to participate in a project sponsored under the MSRA understand in advance how IP will be managed.

Identifying and developing research opportunities is sometimes a hit-or-miss proposition, with a large component of serendipity, within a large and complex company like this one. Also, it is difficult for a university, even one as well known as this institution, to achieve a broad and high level of visibility of its research capabilities within the sponsor organization.

To address these challenges, both the company and the university have been very active in developing extensive networks and cultivating research opportunities. Neither side waits for the other to approach first; either side is ever ready to take the initiative. Also, the university research-programs leader has taken on the role of "business development" person in order to explore research opportunities.

Finally, close collaboration makes the sharing of research outcomes an integral part of the research process. This contrasts with classic technology transfer, which occurs serially after the research is finished.

LS-6. Industry Subcontract with a University on a Federal Contract

❖ Basic structure, description of the partners, and general motivation

The company

The company, a large multinational in the IT and imaging industries, had concluded a contract with a federal agency to perform materials research that could be important for several of the company's businesses.

The university

The university is a campus in a large state system. Several leading physicists and materials scientists are working in the relevant area of materials research.

- The opportunity

  The company
  The federal research contract specifies that the company will be the prime contractor, with subcontracts to universities. This structure allows it to gain access to leading-edge university research in an important new area of federal support. The company seeks to demonstrate to the federal agency that commercial products from such an arrangement are possible.

  The university
  The university gains support for important materials research. Its previous negotiations with this particular company have had some difficulties, so this subcontract is an opportunity to improve that relationship. In addition, the university had recently changed its organizational structure for technology transfer and sponsored research, in part to address structural barriers to working with industry. So this negotiation gives the university a chance to introduce new and more effective principles and practices.

- Risks and vulnerabilities

  The company
  A long, drawn-out negotiation would delay research and impair the company's performance on the federal contract. Also, because background intellectual property (IP) was licensed by the university from another institution, the agreement had to avoid provisions whereby this background IP might block the company's ability to commercialize the results of the research.

  The university
  An unsuccessful negotiation would risk further impairing relations with the contracting company and disappointing the federal agency. In addition, because the university had agreed to be the primary university subcontractor and to conclude additional subcontracts with two other institutions, they too would be disappointed. Failure would mean foregoing support for an important new area of research and undermining the new principles and practices the university was seeking to introduce in its industrial collaborations.

- Underlying model

  The company had concluded a contract with the federal agency for materials research. Several elements of that contract would have to flow down to the subcontract and were not subject to renegotiation. The company also concluded a sponsored-research subcontract with the university that included IP provisions. For its part, the university had licensed background research from another institution. The university, in turn, concluded research subcontracts with two other institutions.

- Intellectual property role and usage

  As mentioned above, there was a need to address the role of background IP. Foreground IP (knowledge transfer from the company and the federal agency) had to be limited as well because the university researchers did not want to limit future support in this area to the company and the agency. The project itself contemplated some generation of intellectual property, but not at a fast and furious pace.

  The company preferred for the university to publish without the possibility of patenting, while the university preferred that its researchers be able to patent. University researchers were concerned as well about their ability to publish in a timely manner without restrictions. The company agreed to allow researchers to patent, and it promised to review articles quickly and not insist on wholesale revisions.

- Playbook

  The company and university agreed to use a sponsored-research interaction process (SRIP), a new mechanism developed by the university to avoid problems that had commonly arose in its previous negotiations with companies. In fact, in an earlier negotiation between this company and the university, some participants had adopted inflexible positions that had derailed progress.

  SRIP required higher-level participation at the outset and at key points, from both organizations, than is typical in sponsored-research negotiations. The senior leaders had authority and were accountable. SRIP also required more time and effort to form teams whose members had well-defined roles, to provide opportunities for the team members to get acquainted, and to produce a "term sheet" (a summary of the outcomes of the negotiation—i.e., of the shared conceptual understanding between the company and university). The whole process was deemed well worth undertaking in order to improve this particular relationship and to validate the SRIP concept for future negotiations. And to raise the probability of success, three participants in previous negotiations were specifically excluded from the process.

  The up-front time and effort allowed the teams to build trust and rapport, and the use of the term sheet allowed them to avoid premature exchanges of drafts. The teams decided to structure interaction on a "warm embrace" model, whereby the university and industry researchers could collaborate and have insights into each other's work.

  An aggressive, one-month timeframe for negotiations was adopted in order to avoid past problems with negotiations that were open-ended, could snag on a single point, and tended to follow an opaque, attorney-to-attorney procedure. Despite the greater time and effort required up-front for SRIP, they are actually worthwhile investments; they help to avoid endless time at the later stages spent defending fixed positions that will not converge.

  Nevertheless, the negotiations did go through several stages of divergence and convergence. It was necessary for the leaders to intervene at several points to keep things on track and ensure that the teams were following the process that had been

agreed to. At one point, the university side developed a creative solution for dealing with IP (a covenant not to sue) in order to get past a difficult stage. At another point, the university had to shift negotiation and policy-articulation responsibilities among team members. Also, when one of the company attorneys went on vacation and appointed an external attorney as a substitute, upon returning he rejected some of the compromises made by the substitute in his absence.

In the end, the negotiations were successful. They demonstrated the value of the SRIP model and built relationship capital that will benefit future collaborations. On the university side, the negotiation also proved the value of a reorganization that combined the industry-relations and technology-transfer operations, thus allowing the university to get the right people on its team. In the year after the reorganization, the amount of sponsored research tripled.

LS-7. Agricultural-products Company and Land-grant Institutions

- Basic structure and description of the partners

  The company
  A large, multinational firm that provides agricultural products and biotechnology research on plant traits.

  The university
  A number of land-grant institutions that contract with the company.

- The opportunity

  The company
  (1) Access to researchers with expertise in conducting field trials necessary to fulfill the company's regulatory requirements.
  (2) Field trials, while relatively inexpensive for the company to fund, take a lot of time in establishing each individual contract. The negotiated five-year master agreement reduces the amount of time needed to get products to researchers and for field trials to begin. With the university on board, the company is now able to have a higher throughput of contract fulfillment.

  The university
  (1) Can fulfill some of the mission of land-grant universities—in particular, to report to farmers in their state on how various seed varieties work under different conditions.
  (2) Can obtain funding from the company to perform field trials.
  (3) Gains access to proprietary company information and products researchers would not otherwise be able to use.
  (4) Five-year master agreement allows each individual trial to run as a service order—i.e., not requiring legal institutional review—thereby speeding up the process considerably.

- Risks and vulnerabilities

  The company

  (1) Ownership of all inventions and discoveries that are developed using company materials belong to the company; inventions and discoveries not directly related to company materials are owned by the university. The company has the first option to negotiate either an exclusive or nonexclusive license to any inventions and discoveries owned by the university. However, this option remains in effect only for six months after completion, expiration, or termination of the individual service order, after which the university is free to market such assets to third parties.

  (2) Required waiting periods for publication review may cause friction with university researchers, whose time scales may differ.

  (3) Contracting with external researchers necessitates relinquishing company-proprietary products and information. This risk is managed through the contract provisions and compliance with federal requirements.

  The university

  (1) Publication of results is subject to prior review by the company, which requires 60 days. If the company finds anything deemed patentable, the university researcher must wait an additional 90 days for patent applications to be filed. This process may hinder the university's publication efforts.

  (2) The company owns all rights to any information or product derived from the university's use of company proprietary materials or information.

- Underlying model

  (1) Replaces original contract protocol, which required time-intensive legal review for each iteration, with a master services agreement that sets the basic terms and conditions for a five-year period. Each individual trial is run as a service order, thus not requiring legal review at the university. This scheme greatly shortens the timeline from agreement to field-trial initiation.

  (2) Each party can decide, at its sole discretion, whether it wants to participate with the other party in commercial development of any product.

- Lessons learned

  Negotiating a long-term basic framework for a standard set of experiments allows for efficient service-order completion, saving the company and the university negotiation time and thereby allowing university researchers to plant seeds within their growing season.

LS-8. Industry/university Relationship—Aerospace Company

❖ Structure, activities and benefits

The company
A high-technology aerospace company involved in commercial and government activities.

The university
Has a College of Engineering that contains several centers of excellence whose activities span many areas of research interest to the company. These centers comprise multi-investigator efforts as well as individual contributors. Funds for research come both from governmental agencies and the private sector.

❖ The opportunity

The company
- Gives access to several researchers in well-staffed and well-equipped laboratories developed over many years with financial support from numerous sources. These researchers understand the business of the company, having worked actively in the area for many years and produced good results.
- Provides a link to high-quality graduate students who are possible future employees.
- Enables very cost-effective research on items that are at a lower Technology Readiness Level (TRL)—degree of maturity of an evolving technology with regard to commercial applicability, as measured by U.S. government agencies on a scale from 1 to 9.

The university
- Benefits from interaction with a major company in the aerospace business with a long history of technological advances.
- Enables a link that keeps university research on a level relevant to industry.

❖ Risks and vulnerabilities

The company
- Is the university work aligned with the future technology plans of the company and the correct TRL?
- Can the university handle International Traffic in Arms Regulations (ITAR) work, if necessary?
- What is the relationship with the university with regard to intellectual-property (IP) rights?
- If necessary, can the university support work in a program whose time frame differs from that of the typical school year?
- Will the university researcher accept joint programs with defined objectives, goals, and schedules that reflect the culture of the company?

The university

- Does the company understand the issues that the university has to deal with, such as degree process and timing? And is it willing to support them as much as possible?
- Does the company appreciate the cultural differences between the two organizations and is it willing to consider them in the development of contracts? For example, the university is a learning organization in which faculty publications are a requirement for career advancement.
- Can conflicts between IP rights and publishing requirements be resolved?

❖ Underlying model

Because the university had diverse capabilities of interest to the company, several agreements were negotiated. First was the non-disclosure agreement (NDA) that permitted discussion of technical detail on a proprietary basis only. The company has a standard-format NDA that defines the work to be done, the money involved, and the amount of time of the effort, as well as data protection, copyright, patent, publication, indemnity clauses, and other legal issues. This document basically initiates conversations with a contractor for a one-time research and development contract.

Once a relationship has been established, the NDA can lead to a longer-term agreement, structured as a "task-order contract," such that additional work and funding can be added at any time. Alternatively, the company can opt for an extended length-of-time service agreement.

In this particular case, a task-order contract was negotiated and signed, and the university then initiated work. This research was in the area of aerodynamic wind-tunnel work, measurement-sensor development, and like projects at a TRL of 1, 2, or 3. In addition, the university has the ability to manage ITAR requirements. Additional work packages have been added to the agreement since it was initiated.

❖ IP roles and usage

In this case, the university granted the company a license to use any and all inventions resulting from the work for the payment of a one-time royalty fee. The university retains the right to publish the results of the work for academic purposes, subject to protection of the company's proprietary information and patent rights. But if so requested by the company, the university withholds results from public distribution for a number of years while permitting graduate students to complete thesis or dissertation work and obtain their degree.

❖ Playbook

This program illustrates that if the company and the university understand each other, useful agreements are possible. But it is a two-way street. The university must appreciate the business needs of industry, particularly in terms of IP and proprietary rights. At the same time, the company must realize that the university faculty have publishing needs on which career progression depends, and that provisions can be made for publishing while still protecting the company's IP.

Such mutual understanding is facilitated by the company's formalized system of NDA formats, short-term one-time agreements, and long-term task-order agreements, as they help to define the process of developing a university/company relationship.

One important success factor for such collaborations is to focus on technologies with low TRLs—that is, in earlier stages of development. The work in these areas, typically related to physical phenomena and the generation of basic knowledge (as opposed to, say, development of commercial products), is often less critical in terms of IP.

But it is essential that the university be able to deal with ITAR issues, such as by having graduate students assigned to the project who are U.S. citizens and can therefore work on the program. If this were not possible, then this company-sponsored work would have to be taken elsewhere. In this particular case, however, that was not a problem.

Dealing with universities is sometimes difficult, especially if university policies and the faculty mindset are not aligned with application-oriented industrial needs. Mutual understanding is a key component of cooperative work, but such understanding cannot always be achieved.

LS-9. Multi-institutional Partnership Driven by a Federal-Agency Priority

❖ What we are doing

This study involves a nonprofit regional collaborative, located in the Midwest, working with the National Science Foundation (NSF) through the latter's Partnership for Innovation (PFI) program, which encourages local and regional partnerships between universities, industry, and other profit or nonprofit organizations.

The collaborative, already in place prior to the NSF-PFI grant application, was created in 2001 within a region with significant but scattered intellectual assets and characterized by a history of minimal inter-institutional cooperation. These institutions bonded to focus primarily on the life and material sciences, and their collaboration was cemented by the establishment of a nonprofit corporation licensed under state law. This partnership received a significant boost from the NSF-PFI funding.

For the purposes of the NSF grant, the partnership consists of a Fortune 500 industrial company, a respected master's-level university; the medical-school branch of a large state university system, an urban public-school district, a large community college, a large federal research facility, and a large comprehensive hospital.

The goals of this partnership with respect to the PFI project include: leveraging intellectual assets to spur R&D partnerships; workforce-development programs that spur the region's human-capital assets; and developing an intellectual-property (IP) management model that will ultimately generate revenue, part of which will fund future partnership activities in the region.

- The opportunity

  All the parties to this project were fueled by their own self-interest, whether that was profit, grant and research dollars, increased student involvement, or educational benefits. But they all had a common desire to improve the short- and long-term economic conditions within the region.

  Historically, these partners rarely collaborated in a strategic manner. Thus the creation of the collaborative was a major achievement in terms of cooperation, and the funding provided by NSF was instrumental in securing additional funding.

- Risks and vulnerabilities

  All the parties were subject to a significant amount of risk and vulnerability simply because this kind of collaboration was new to them. Discipline-specific collegiality and cooperation at the local level were often absent before this collaborative existed, and during the two-year period prior to the NSF award there was a considerable amount of skepticism. Now, however, collaboration is not the exception but the rule.

- Underlying model

  This is a multi-institutional model headed by a steering committee composed of leaders from the partner organizations. NSF-PFI guidelines and prior award information have also had some impact on the model.

- IP role and usage

  IP agreements between the partners needed to be executed. A master agreement governing IP between all of the organizations was rejected because there was little political support for such a complex document. The IP management model is still under development and is being shared with NSF as a project deliverable. Meanwhile, significant IP that was sitting on the shelves of at least two of the institutions has been donated to the collaborative.

- How we navigate the interfaces

  The NSF project has been a success in terms of providing deliverables to the agency and strengthening the regional collaborative. The NSF award has led to additional funding from federal, state, foundation, and corporate sources. Concerns about the loss of autonomy and control turned out to be unfounded, and collegiality between the organizations has actually been increased. The single most critical factor for success in the partnership has been the buy-in and truly active involvement of senior leadership at the partner institutions.

LS-10. Applied Sciences and Engineering Solutions Research (ASESR) Program: Risk Assessment Process

❖ Background

When working with industry, the university must recognize the sponsor's need to reasonably exploit, with due competitive advantage, the commercial viability of technologies, products, or processes. Industry, on the other hand, needs to recognize the university's responsibility to ensure the broadest public benefit from the results of academic research.

Both parties also must understand that all research is not the same and that individual projects' intellectual property (IP) and publication arrangements may vary. Needs relevant to a faculty-initiated research project involving fundamental research, for example, may be quite different from those associated with a company-initiated project to provide an incremental improvement to one of its products.

Many proposed arrangements will require extensive negotiations. However, in order to facilitate the negotiation process, some model arrangements that can streamline the path to final contract have been developed. While the fundamentals—such as the fact that all industry contracts must recover full F&A (facilities and administrative) costs—may not change, provisions such as IP disposition depend on the circumstances. The following information shows some of the standard ways of conducting industry-sponsored projects.

❖ Support for fundamental research

University researchers often engage in basic research, which focuses on generating new knowledge. This is inherently publishable, though some of it may be novel enough to justify pursuit of patenting and licensing. In any case, under this form of research the university reserves all rights to publication and ownership of patents, under which it can offer companies and other sponsors an option to negotiate a license for rights to the resulting technologies.

❖ Support for Academic Research Services (ARS)

University researchers are sometimes called upon by companies to provide expert analysis, characterizations, or measurements that they are uniquely qualified to provide because of access to specialized testing equipment and high-level mathematical and other academic skills. Under this form of research, companies retain rights to all materials they provide and results generated for them under the testing protocols. The university, however, has rights to any new developments in research/testing methodologies or technologies invented by university researchers during the academic research service. The university also retains rights to publish general scientific knowledge resulting from the academic research service that does not disclose company-proprietary information.

- Support for Applied Sciences and Engineering Solutions Research (ASESR)

  Often, companies will come to the university for assistance in applying scientific and engineering expertise to company-specific problems in the area of fundamental research, and in some rare circumstances to non-fundamental research and development. In keeping with its academic mission, the university may comply when such projects offer an intellectual challenge to faculty, provide them with real-world problems to analyze for the benefit of their own research and instructional interests, and help them train students in particular skills.

  Under this form of research, companies may retain ownership of all deliverables. Because no patentable intellectual property is anticipated from the project, the university does not make any ownership claims, with the full understanding and concurrence of the principal investigator (PI) and all project staff.

  The university should nevertheless make every possible effort to retain publication rights, especially if graduate students are involved. However, rare exceptions are possible under ASESR (pronounced "assessor") projects. With a special request for a waiver from the project's PI and staff, the university may agree to a limitation on publication rights under certain circumstances. For example, the ASESR research may not be the kind that would typically generate publications for scientific journals; to the contrary, its real value for the faculty member may lie elsewhere. Thus a limitation on publication does not necessarily threaten academic freedom or constitute an abdication of public responsibility. It may even promote academic freedom for faculty who find it academically necessary to engage in ASESR-type projects with companies in order to support their research and education activities; and it may actually better fulfill the university's obligation to take scientific knowledge and translate it into public use.

  In the event that publication restrictions are applied to research and technologies covered by ITAR (International Traffic in Arms Regulations) or EAR (Export Administration Regulations) controls, the university relinquishes its fundamental-research exemption altogether. Moreover, a special investigation will be needed to determine if national-security standards can be met for the project and whether or not its academic component is significant enough to justify the university's participation in the first place.

- Risk Assessment Process (RAP)

  The RAP is utilized to facilitate the special risk assessment required for ASESR projects. The process starts with the PI assessing risk factors and completing the "Risk Assessment Sheet." The university then conducts a preliminary risk assessment of the research project to give assurance that it provides all-around low risk for the university and project investigators. If the project meets this test, the university will process the RAP Sheet with the associated risk sign-offs and submit all the normal review documents (Internal Approval Form, Institutional Review Board review, Institutional Animal Care and Use Committee review, and others) to the Office of Sponsored Programs. This office completes the final risk assessment and processes the agreement with the company through expedited channels, and then notifies the university of acceptance or rejection.

ASESR PROJECT RISK ASSESSMENT SHEET

For Eligibility under the Risk Assessment Process

Circle T for true or F for false (If you check false, please provide additional justification for eligibility in the spaces below):

1. T or F: A publication or thesis is not an expected outcome.
2. T or F: Students will not be working on the project.
3. T or F: If students will be working on the project, they will not be using proprietary data, as defined in the funding agreement, for thesis work.
4. T or F: The research project proposed will not generate new IP that is patentable or licensable, but will be limited to general know-how.
5. T or F: No legal right to existing university background IP will be provided to the sponsor.

❖ PI in conjunction with College/Unit Research Office:

6. T or F: No final or end-stage product* will be delivered to the sponsor. (This requirement is included to identify potential product liability.)
   ** Including, but not limited to, prototypes, operating technologies intended for the market, and design specifications intended for commercial products.*
7. T or F: The project does not present a conflict of interest for the PI or project personnel (i.e., the faculty member or other project staff do not have a significant financial interest in the sponsor).

❖ FOR OSP:

8. T or F: No tax-exempt bond-financed facility will be used in conjunction with this project.

_____ _____

Principal Investigator Research Dean/Director

❖ For OSP Review:

College Sign-Offs Required:

- Principal Investigator and Project Personnel IP waiver request and agreement.
- PI and Project Personnel publication waiver request and agreement.
- Graduate Student thesis/publication request and agreement.
- ITAR/EAR security requirements request and agreement.
- College Financial Risks request and agreement.

APPLIED SCIENCES AND ENGINEERING SOLUTIONS RESEARCH PROGRAM (ASESR) GUIDING PRINCIPLES

- University seeks more funding from industry. This may require:
  - The university to be more flexible in regard to intellectual property in contracting with industry.
  - Negotiating contracts from a "risk assessment" base rather than a policy base.
- University wants to be responsive to the needs of faculty in their pursuit of industrial funding.
  - Not every project justifies rigorous negotiations over IP and other contract terms.
  - Some projects are conducted to establish a working relationship with a company.
- Faculty have the best understanding of the scope of work of the project and the potential for generation of licensable IP.
  - Faculty will initially identify projects for expedited review.
  - Faculty will have to acknowledge risks involved and sign contract to show concurrence.
- College/Unit will have to assume and/or share financial risks associated with exceptional contract terms.

  Expedited review process will involve policy and structural changes:

  - Expedited review process must be acceptable to faculty, college/unit, and financial and academic officers (i.e., it must become "policy").
  - Expedited review process must flow outside of the normal contract process so that it is clear that the project is "different" and that it meets the norms established for expedited review.
- The expedited process is not currently applicable to:
  - Federal flow-through
  - Clinical trials.

LS-11. "Fast track" Agreement (FTA)

- Structure, activities, and benefits

  A Fortune 100 company wished to sponsor a fundamental research project, at a leading U.S. university, focused on investigating the basic mechanism of a catalytic process that was of commercial interest to the company. Thus while the company had already filed patents on a specific catalyst and catalytic process, the project's statement of work was jointly developed by the university principle investigator and company scientists to ensure that this particular research would be fundamental in nature. As a result, the expectation was low that any intellectual property (IP) would be developed during the course of the research.

- The opportunity

  The company:
  The project would allow the company to gain access to state-of-the-art facilities and the services of a principal investigator skilled in characterization techniques highly appropriate to a catalytic system under company investigation. Fundamental knowledge developed during the project could thus be applied by company scientists to their internal research efforts directed toward improving that system.

  The university
  The principle investigator and participating students would benefit from interaction with company scientists, gain access to samples of catalysts unique to the company, receive funding for research, and publish research results.

- Risks and vulnerabilities

  The company
  The timing and deadlines for the company to respond to disclosure of a university invention (sole or joint) were limited.

  The university
  Early termination of company funding could occur if its priorities should change during the course of the project.

- Underlying model

  The project represents a model of company-sponsored university research for which an agreement is advisable but where, inventions being unlikely, the company has little need for preferential rights to IP. The company therefore believed that the suitable agreement vehicle was a company-developed "fast track" agreement.

  The terms of the FTA were based on the "standard" terms offered to companies by the most aggressive U.S. universities, though in this case the company's IP rights were significantly less favorable than what it can usually negotiate. For example, the trigger and timing of entering into negotiations for rights to sole or joint university inventions were very much compressed relative to the company's preferred

position—negotiation-timing triggered by invention disclosure (as opposed to patent issuance). However, the advantage of the FTA terms being close to the university standard position was that the time to negotiate an agreement would be reduced and the project could be implemented sooner.

❖ Lessons learned

As expected, little time was spent negotiating IP language. But more time than expected was spent on other issues, such as the keeping of research records and finding satisfactory language to deal with cases in which the university's licensing rights were somehow encumbered. For example, a student working on the sponsored project might talk about it with another student, not covered by the research agreement, who might then proceed to make a related invention. Nevertheless, these and other issues were dealt with reasonably quickly: an FTA was executed within one a half months of the opening of negotiations. By contrast, negotiations on standard research agreements can take four to six months or even longer.

LS-12. R&D Subcontract to a University from a Multi-partner Consortium

❖ Basic structure, description of the partners, and general motivation

The company
The collaboration, pertaining to automation for assembly operations, involves four companies—two large businesses (Fortune 10), two small businesses, and two national labs—and it is managed by the National Center for Manufacturing Sciences.

The university
Participating researchers are skilled at automation engineering, human performance analyses, and code development.

❖ The opportunity

The company
Received expert human-performance analyses as well as robot control code that integrated genetic algorithms for the purpose of self-teaching.

The university
- Received financial support for its work.
- Received a unique Alpha robotic device for use in analyses, code development, and testing.
- Retained the Alpha robotic device for future research.
- Published numerous technical accounts of the collaboration.
- Received national engineering awards for the project's achievements.

- Risks and vulnerabilities

  The company
  Graduate students were comprised both of U.S. citizens and foreign nationals, raising the concern that innovative technology resulting from the collaboration could migrate to foreign competitors before being fully implemented in the United States. Moreover, small-business technology developers would not be able to pursue international patent enforcement.

  The university
  Researchers gave up exclusivity of intellectual-property (IP) rights to work in a truly unique technology environment.

- Underlying IP model

  The IP provisions of the Bayh-Dole Act, which underlies patent-rights policies of universities for government-sponsored research, were incorporated. The university did not own rights to its inventions but was granted a nonexclusive, royalty-free, perpetual license to use its contract-generated technology, IP, technical information, and other work products for any noncommercial purpose. University publications required 30-day written pre-approval by the companies. For their part, the companies acquired IP protection for future commercialization.

- Lessons learned

  The model worked well. The IP interests of each partner and contractor in the technology were preserved.

LS-13. Subcontract for Data Analysis to a University from a Multi-partner Consortium

- Basic structure, description of the partners, and general motivation

  The company
  The collaboration pertained to assessment of new technology for condition-based maintenance—defined as the performance of maintenance actions based on measurements of operating parameters of machinery or equipment (as opposed to adhering to a predetermined maintenance schedule). Managed by the National Center for Manufacturing Sciences, this project involved two companies—one a small-business technology developer and the other a Fortune 10 user with plants around the world—and multiple participants from the Department of Defense (DOD), particularly the U.S. Marine Corps and Navy. This team generated new-technology input data in real-world applications, and provided those raw data to the university for use in the comparative studies.

  The university
  The professor was a known expert in the traditional analysis technique who also possessed some knowledge of the new technology.

- The opportunity

  The company
  The companies and DOD received analysis and interpretation of new-technology performance (as compared to the traditional methodology) from an expert source. The technology developer gained valuable knowledge from the validation of its instrument, identification of opportunities for improvement, and use of the university results for market development and market entry.

  The university
  - Received financial support for its work.
  - Gained in-depth practical knowledge of the new technology's performance.
  - Had opportunity to compare the new technology with traditional methods.
  - Had opportunity to publish in the new-technology arena (with advance permission from companies).

- Risks and vulnerabilities

  The company
  Untimely release of performance data would jeopardize market entry and market penetration.

  The university
  None.

❖ Underlying IP model

Standard flow-downs consistent with Code of Federal Regulations Section 401.14, which governs IP rights to inventions made by small businesses and non-profit organizations on government grants and contracts, were permitted for each team member, including the university. However, the university was limited to data that it had solely generated. Technical information belonging to others was covered by nondisclosure and use restrictions.

❖ Lessons learned

The collaborative team thought that the relationship would be primarily with the professor, as the exclusive provider of technical expertise. Instead, the comparative data analysis was dependent on preliminary work assigned to graduate students who had little investment in the university-industry relationship.

The professor failed to manage student performance and the timeliness of deliverables.

The university's final report, written by a student, was poorly done, and the collaborative team had to redo the report to make it acceptable for DOD, particularly in terms of exploiting the comparative analyses and conclusions.

Industry and university objectives were at cross purposes. The university wanted grants for student stipends; industry wanted contract performance and deliverables.

The timeliness expectations of industry and the university were incompatible. The university was not able to respond to industry's needs, which were driven by market and production forces, while industry was unable to accept the university's adherence to cycles and constraints of the academic year.

LS-14. A New Industry-relations Paradigm

❖ Basic structure, description, and motivation

In late 2003, intellectual property (IP) management at the university was restructured to support its preeminence as a cutting-edge research institution and to streamline its interactions with industry. University contracts with industry had formerly been managed and negotiated by distinct offices with different missions. But after an outside task force recommended consolidation and streamlining of IP negotiations with industry, the university's top administrator for research established a single portal for companies' access to the university.

That new unit, called IPIRA (Office of Intellectual Property and Industry Research Alliances), acknowledges the importance of industry-university collaboration as an innovation accelerator that fosters translational research and fuels economic development. To establish, nurture, and maintain multifaceted relationships with industry, new and innovative partnership models have been forged in IPIRA while upholding the mission and values of a public research institution. New job descriptions and a new HR classification system were created to staff IPIRA with flexible, principled, and seasoned negotiators who support the research enterprise and, as a group, can enhance corporate relationships on all fronts.

❖ Restructuring enables new IP-management strategies

In IPIRA, technology transfer consists both of "incoming" and "outgoing" transactions. That is, corporate support for research and industry collaboration is valued as highly as traditional metrics for measuring technology-transfer success. A given outcome—for example, the grant of a royalty-free license to IP—does not detract from the bottom line if it provides value of another sort to the campus as a whole, such as by attracting research funding or corporate collaborations. By contrast, in the former system, such a result may have been achieved at the expense of another (or in competition with another). Now, it is encouraged and enabled.

Such new metrics and motivations enable a full spectrum of IP-management strategies to be employed in IPIRA to achieve its goal of maximizing the university's impact on society. For example, one strategy benefits the developing world by providing free access to university IP, resulting in new models for partnering with philanthropic organizations to accelerate translational research on neglected diseases.

❖ Results

In the first year after the establishment of IPIRA:

- Corporate-sponsored research at the university nearly tripled
- Negotiation times for research and material-transfer agreements were dramatically reduced
- New contract templates were developed
- A new clinical-research program was established in the School of Optometry
- New industry-affiliates programs were established in Electrical Engineering & Computer Sciences and Chemistry
- Corporate and foundation gifts increased
- New translational research programs were launched (including some under our so-called socially responsible licensing initiative)
- New relationships were established with a local hospital's research institute, a local business park, and a contract-research organization.

LS-15. Small-company Manufacturing-process Technology Case Study

- Structure, activities and benefits

  The company
  A producer of manufacturing equipment and related consumables and process technology to a broad range of manufacturers (including automotive, aerospace, die/mold, and medical). Though "small" (under 500 employees), the company has demonstrated experience in attracting federal R&D funding and bringing new manufacturing-process technology to industry. The company's motivation is to add new compatible manufacturing processes to its existing product menu.

  The universities
  University A—Premier (Top Ten) research university multi-investigator center with one professor more intensely involved than others. There are ten to twenty students (undergraduate and graduate) plus three to four full-time research staff in the lab. This center, supported by multiple grants from federal agencies and company consortia, is structured to allow significant leveraging of staff, funds, and equipment. Its motivation is to fund further research, thereby triggering further development, and to see the resulting intellectual property (IP) implemented for significant public benefit.

  University B—Respected research university within a large state system. Small, modestly funded lab with five to ten students (one or two graduate students) led by a very creative professor. This researcher's motivation is to grow the lab, support additional graduate students, and see technology deployed for the public benefit.

- The opportunity

  The company has negotiated royalty-bearing license agreements with both universities for complementary manufacturing-process technologies originally invented without company funding. As licensed, both technologies were far from "market-ready" and required significant further development before they could be "industry-viable." The company intends to provide funding to the universities, both directly and through federal industrial R&D funding programs, for research likely to yield improvements to these base manufacturing-process technologies. This research would likely generate trade-secret information as well as patentable inventions.

- Risks and vulnerabilities

  The company
  Original "inventions" of new manufacturing processes, though they may have broad scope and provide powerful intellectual-property protection, are very likely to require substantial refinement and improvement. Otherwise, they cannot be implemented into production processes or, more importantly, enable product designs that can be confidently introduced to the marketplace. The company must have access to such improvements and a clear awareness of the corresponding royalty costs before it can responsibly promote the adoption of the new manufacturing

process by product manufacturers. If the improvement IP is not accessible, or if the "stacked-up" royalty percentage rates are cost-prohibitive, the company will be burdened with unacceptable risk and there will likely be no adoption and implementation.

The Universities

As IP is generated by faculty other than the original inventors, the royalty income that is to be shared with them by the university becomes potentially difficult to identify unless there is an additional license that specifies additional royalty percentages beyond the original patent. Without such a mechanism to define the value of each piece of IP and to whom credit should be given, the motivation for faculty to develop improvements is greatly reduced. Moreover, the original inventors may not want their reward from early "foundation" patents to be diluted by having to share royalties with later inventors of less-powerful IP on process improvements. Additionally, university policy generally seeks to avoid the risk of pre-assigning IP rights for inventions not yet made. The fear is that the early licensees may not be the best possible licensees for related technology that is developed years later.

❖ Underlying model

University A's license language provides that no additional royalty percentage need be paid by the licensee for IP related to improvements to the original patented technology, provided that they come out of the same lab. Consequently, over $1.4 million in funding was provided, directly and through grants initiated by the company, to the lab at University A. The resulting process-technology improvements have led to successful commercial implementation, generating hundreds of thousands of dollars of royalty revenue and providing significant public benefits.

University B's license language demands that the company pay an additional royalty percentage on improvements—even those derived from company direct and indirect funding. The university's funded research contract language even sought to capture, exclusively for the university, inventions made in part, or entirely, by company personnel "working in collaboration with the university personnel in the course of their work with the university." Consequently, the company has little incentive to collaborate with University B and is instead working on its own or with others to improve the licensed technologies, using the inventor solely as a consultant.

❖ IP Roles and Usage

Having licensed the foundation technology, the emergence of IP rights to improvements becomes an incentive for the licensee to invest further as long as it receives those IP rights without being levied for an additional royalty percentage. The improvements, after all, should lead to a more valuable process and, consequently, more sales and royalties, without an increased royalty percentage. The licensee would normally pay the costs of obtaining any additional, improvement-related patents.

❖ Playbook

This case illustrates the importance of IP rights to smaller companies, who don't usually have overpowering market presence, for protecting their market position. On the other hand, "daughter" patents that address process improvements, though of little value to companies other than the licensee of the base patents, may still potentially be used to prevent that licensee from introducing an updated process to the manufacturing marketplace.

It is important for universities to find some system for fairly allocating royalty income across inventors of original processes and inventors of improvements. At the same time, generating a protective shield of IP, which can protect both market position and margin in the highly competitive environment of manufacturing, is especially important to small companies.

LS-16. Collaboration in Pharmaceutical Research with Innovative IP Provisions

❖ Basic structure, description of the partners, and general motivation

The company
A large pharmaceutical company wishes to sponsor research at a public university by providing moderate amounts of research dollars and materials.

The university
A public university wants to research specific biological pathways involved in metabolic disorders. Although not absolutely necessary for conducting the research, materials provided by the pharmaceutical company may provide ground-breaking discoveries of interest both to the researcher and the pharmaceutical sponsor.

❖ The opportunity

The company
The proposed research may result in discoveries relevant to the company's business interests, and may suggest alternative applications for proprietary compounds already owned or licensed by the company.

The university
Though not the university's only source of funding for the proposed research, the company's contribution is needed to adequately pursue the researchers' primary interest—to further explore and understand various biological pathways relevant to improving health standards and therapeutic treatments. More generally, the university will have the opportunity to conduct challenging research that will reinforce its position as a research leader and fulfill its educational mission.

- Risks and vulnerabilities

  The company

  It is possible that the research will not result in anything useful for furthering the company's business interests or, in a worst-case scenario, yield data negative to the company's proprietary compounds and market position.

  The university

  Obligations to the company might inhibit further advancement of any discovered technologies and minimize returns, whether in financial or public-acknowledgment terms, to the researcher and institution.

- Underlying model

  The parties propose entering into a sponsored-research agreement, as long as the company provides a certain level of research funding—intended to be supplemental to a federal grant relating to the research—and access to its proprietary compound. In return, the company requests access to all data and a nonexclusive, royalty-free license to use any inventions, discoveries, or ideas arising from the sponsored research. For its part, the university offers a right to negotiate a royalty-bearing license for all such outcomes.

- Intellectual-property role and usage

  The principal position of the company is that it should be able to enjoy the fruits of the research without having to pay any further consideration to the university. Although not enough to cover all of the proposed research, the company deems its contribution of funds and provision of materials sufficient to grant it unlimited rights to the discoveries.

  The principal position of the university is that the critical contributions to the research effort—the expertise and facilities—are its own. In addition, public use of the discoveries is an essential element of the university's mission and its obligations to provisions of the Bayh-Dole Act, which govern inventions developed with federal funds. The university is also concerned that a nonexclusive, royalty-free license granted to the company could reduce any interest that other parties might have in commercializing the discoveries. Moreover, if any discovery is groundbreaking, this could result in a substantial windfall to the company with no additional benefit to the university.

After several rounds of negotiation, the parties agreed to the following structure:

1. The company received a limited, nonexclusive, royalty-free license to use the inventions for any purpose. If a product utilizing those inventions is ultimately introduced into the commercial marketplace, the parties agreed that when its sales pass a predetermined threshold the license becomes royalty-bearing. A reasonable royalty rate is to be negotiated in good faith by the parties.
2. The company maintained the option to negotiate an exclusive license.
3. The company agreed that if it had not established a bona fide research program involving the inventions within five years of disclosure, the university had the right to terminate the license.

❖ Playbook

The intellectual-property structure illustrated a fair compromise that addressed the concerns of both parties. The threshold established was based on an estimate of the fair value of the company's contribution to the research. It was agreed that anything above that threshold would be a windfall to the company, such that a reasonable additional contribution to the university would be justified. Moreover, the company found the sunset provision to be acceptable. The company acknowledged that if it had not used the technology within five years, it was unlikely ever to do so.

UNIVERSITY-INDUSTRY PARTNERSHIP PROJECT TEAM MEMBERSHIP, 2003-2005 INCLUSIVE

❖ Red Team

Bruce M. Kramer (Team Leader)
Senior Advisor for Engineering, Division of Engineering Education and Centers
National Science Foundation

Shayan Bhattacharyya
Center for Evaluative Clinical Sciences
Dartmouth Medical School

James J. Casey, Jr.
Executive Director, Office of Sponsored Programs
Cardinal Stritch University

Chuck Concannon
Manager, University R&D Collaborations, Global R&D Strategy
The Boeing Company

Jadranka Curgus
Senior Manager, Global R&D/University Collaborations
The Boeing Company

Kathleen S. Irwin
Senior University Legal Counsel
University of Wisconsin-Madison

Suzy Lebold
Divisional Vice President, Scientific Assessment and Technology, Licensing, Global Pharmaceutical Licensing and New Business Development
Abbott Laboratories

Richard Pearson
President
National Center for Manufacturing Sciences

Roberto Peccei
Vice Chancellor
University of California, Los Angeles

Larry Rhoades
Chief Executive Officer
The Ex-One Company

Sue Skemp
Fellow, Office of Science and Technology Policy
Executive Office of the President

Lou Witkin
Program Manager, University Relations
Hewlett-Packard Company

❖ Blue Team

Jilda Diehl Garton (Team Leader)
Associate Vice Provost for Research and General Manager of GTRC
Georgia Institute of Technology

Roshell Athey
Associate Director, Office of Sponsored Projects
University of Texas at Austin

Tara E. Bishop
Associate Executive Director
National Council of University Research Administrators

Mike Champness
Senior Assistant for Air Dominance
Office of the Asst. Secretary of Defense, Homeland Defense Force Planning and Employment

Sharon Hays
Deputy Chief of Staff
Office of Science and Technology Policy

Carl Johnson
Chief Executive Officer
II-VI, Inc.

Bobby McQuiston
(ret.) Office of Sponsored Projects
Universtiy of Texas at Austin

Bob Norwood
Program Director, Division of Engineering Education and Centers
National Science Foundation

Avron D. Spier
Director of Business Development
Genomics Institute of the Novartis Research Foundation (GNF)

Kai E. Thomenius
Chief Technologist, Ultrasound & Biomedical
GE Global Research

❖ Black Team

Bill Guidera (Team Leader)
Policy Counsel
Microsoft Corporation

Connie M. Armentrout
Director, Technology Licensing
Monsanto Company
Technology Alliances Team

Ann M. Hammersla
Senior Intellectual Property Counsel,
Office of Intellectual Property Counsel
Massachusetts Institute of Technology

Jim Horning
Chief Scientist & Director of
West Coast Operations
Network Associates Laboratories

Al Johnson
Senior Analyst
Corning, Incorporated

Kathleen Larmett
Executive Director
National Council of University
Research Administrators

Sally O'Neil
Manager, Industrial Contracts
Stanford University

Frederic Quan (retired)
Manager, Technology Contracts
Corning, Incorporated

Ted Roumel
Office of Technology Transfer
National Institutes of Health

Brian Stanton
Director, Division of Policy
NIH Office of Technology Transfer
Department of Health and Human Services

Marc Snir
Michael Faiman and Saburo Muroga Professor,
Department of Computer Science
University of Illinois at Urbana-Champaign

❖ Green Team

James A. Severson (Team Leader)
Vice Provost Intellectual Property
and Technology Transfer
University of Washington

Joshua Green
Attorney,Venture Law Group
HellerEhrman, LLP

Mohamed Hashish
Senior Vice President, Technology
Flow International Corporation

Wayne Johnson
Executive Director
University Relations- Worldwide
Hewlett Packard Company

Michael A. Morrissey
Partner
Orrick, Herrington, & Sutcliffe, LLP

K. P. Rajurkar
Distinguished Professor of Engineering and
Director, Center for Nontraditional
Manufacturing Research
University of Nebraska-Lincoln

John H. Raubitschek
Patent Counsel
U.S. Department of Commerce

Richard P. Seligman
Senior Director, Sponsored Research
California Institute of Technology

❖ Steering Committee

Tara E. Bishop
Associate Executive Director
National Council of University Research Administrators

Susan Butts
Director of External Technology
Dow Chemical Company

Wayne Johnson
Executive Director, University Relations
Hewlett Packard Company

Robert Killoren
Associate Vice President for Research
Pennsylvania State University

Kathleen Larmett
Executive Director
National Council of University Research Administrators

Ken Lynn
President, Kauffman Innovation Network
Kauffman Foundation

Merrilea J. Mayo
Director, GUIRR
The National Academies

Roberto Peccei
Vice Chancellor
University of California, Los Angeles

Larry Rhoades
Chef Executive Officer
The Ex One Company

❖ U-I Congress Co-Facilitators

Susan Butts
Director of External Technology
Dow Chemical Company

Robert Killoren
Associate Vice President for Research
Pennsylvania State University

❖ Honorary Delegates

Jared Cohon
President
Carnegie Mellon University

Stan Williams
Quantum Science Research
Hewlett Packard Laboratories

Ben Wu
Deputy Under Secretary
Technology Administration
Department of Commerce

❖ Principal Project Coordinators:

Yvette White
Senior Program Associate, GUIRR
The National Academies

Laura M. Brockway
Christine Mizrayan Science & Technology Policy Intern, GUIRR
The National Academies

Hsiu-Ming Saunders
Christine Mizrayan Science & Technology Policy Intern, GUIRR
The National Academies

Bud Crouch
Principal Partner
Tecker Consultants