Model Language for Patent and Licensing Agreements for Industrially Sponsored University Research in Information Technology

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1 Summary

The intellectual property (IP) generated by universities in the field of Information Technology (IT), originating mostly within Computer Science and Electrical and Computer Engineering departments, is often overvalued by university commercialization and licensing officials. IT IP is fundamentally different from pharmaceutical and agricultural IP, which have been significant sources of licensing income for many universities. Among the differences are the large number of different IT patents and licenses necessary to produce most consumer electronics products, the short time-to-market and lifespan of these products, the complexity and verbosity of IT IP, the necessity of engineering research prototypes into consumer products with the concomitant changes in the original IP, the necessity for faculty and students to work with industry to conduct leading edge research, and the ease with which suitable research laboratories can be set up by industry off campus and staffed by faculty and students.

These differences suggest that universities and their IT researchers have more to lose than gain by the establishment of high barriers to allow industry access to IT IP they create in the context of industrially sponsored research. (IP resulting from government funded research is governed by existing laws and regulations, such as the Bayh-Dole Act [1] in the US, and is not the subject of this memo.) Barriers in this case include not just unrealistic licensing terms, but also drawn out negotiations. This memo supports these conclusions and suggests model language addressing these issues.

This document does not deal with issues related to IP rights in the context of visitors from industry spending time in a university environment, and university faculty and students spending time in industrial environments. These include faculty loan programs, industry funded graduate students, faculty sabbaticals, (summer) internships and co-op terms.

2 Background and Sources

In 2001 the Computing Research Association (CRA) formed a committee to study the production of model agreements for industrially sponsored university research (typically referred to as "industrial-university sponsored research agreements," or "SRAs") in the context of Computer Science and Electrical and Computer Engineering Departments. The primary motivation was to reduce the time and effort spent in negotiating such agreements. The committee was to pay particular attention to the disposition of intellectual property

(IP) generated by industrially sponsored research, since IP issues are often stumbling blocks in the negotiation process. J Strother Moore, committee co-chair, presented the main conclusions of this work at the 2002 CRA Conference at Snowbird.

This memo is based on information gathered from three sources. First, the material in the cited references. Second, interviews of many university researchers, industrial sponsors, university technology licensing officers, and IP lawyers. Third, the study, with the help of several IP lawyers, of several sample SRAs between industry and leading CS/ECE universities made available directly to the committee, or through the CRA.

Eleven agreements were obtained and examined. Some are "initial proposals," i.e., contract templates describing terms that are unreasonably advantageous to one party. Others are actual signed agreements. Most of the latter were provided under terms of strict confidentiality. Some were sanitized to hide the identities of the parties. Nevertheless, we are confident these agreements are actual and between leading players on both sides. The anonymity of the actual parties makes it hard to match initial to final agreemenets, and thus we cannot determine specifically the points of initial disagreement in any single case, only the trends evident from studying the eleven documents in hand.

Nevertheless, the conclusions from these agreements are entirely consistent with both the references cited and interviews with others.

3 Model Agreements

A model agreement is not an effective way to change the negotiating positions of the parties. In Chapter 4 of [6] (page 49), it is written:

> Model agreements are another approach used to speed the negotiation process. These agreements are challenging to develop and implement because business practices in different industry sectors demand disparate agreements, and because different companies in the same industry, and even different divisions within those companies, may present opposing views about how a collaboration should be structured and used. In addition, the sheer number of complex provisions in even simple collaboration contracts makes finding common ground extremely difficult. ...
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> Over the years, many partners have attempted to develop model agreements. One of the first was an eight-page report prepared jointly in 1988 by the Government-University-Industry Research Roundtable and the Industrial Research Institute, called *Simplified and Standardized Model Agreements for University-Industry Cooperative Research.* Neither it nor any of the other efforts have succeeded in fostering a widely effective model agreement.

SRAs are complex for good reason, having to do with the legal and bureaucratic landscapes in which both industry and the university operate. Standards differ from state to state, between private and public institutions, and within corporate cultures, even within the same industry.

Because of these observations about model agreements one is not proposed here. Instead, some language addressing the IT IP issues only is suggested. But in the absence of an appreciation of the importance of industry to CS/ECE research, this language might be considered radically disadvantageous to the university. Therefore, in the following we start by showing it is in the university's interest to treat IT IP specially.

4 The IP Goldmine

Figure 1 shows the most productive U.S. universities as measured by license income on IP [4].

But this chart tells only part of the story. What technologies are responsible for this windfall? It turns out biomedical and agricultural products account for the vast majority of these profits.

At Columbia University in 1995, the top five earners among the licenses generated 94% of the total licensing income. Furthermore, 91% of the income generated by these top five earners came from biomedical licenses [7]. In the University of California system in 1995, 66% of all license income was generated by the top five licenses, and all of them were biomedical. (More recent data, from 2001, indicate that the top 25

institution	license income	research expenditures	income as percentage of expenditures
Columbia	89	279	31.9
University of California system	74	1,865	4.0
Florida State University	57	133	43.2
Yale	41	316	12.9
University of Washington	28	480	5.8
Stanford	28	417	6.6
Michigan State University	24	208	11.4
University of Florida	22	280	7.7
University of Wisconsin-Madison	18	422	4.3
MIT	16	726	2.2

Figure 1: top university license income in millions of dollars

licenses generated 77% of the income and that none were IT inventions [2].) At Stanford University in 1995, the top five licenses generated 85% of the income and 97% of that was from biomedical sources. Among the most important technologies involved are gene splicing, human growth hormone, cancer fighting drugs, and agricultural products.

The predominance of biomedical and agricultural technologies is evident in part simply from the universities listed. Despite their preeminence in computer science, Stanford University and the Massachussetts Institute of Technology (MIT) are not top-ranked in Figure 1. The University of California (UC) system is highly ranked, but other data [2] indicate that the University of California at Berkeley (UC Berkeley), the computer science powerhouse in the UC system, contributed less than 10% of the total license revenue for the system, and much of that contribution came from non-IT IP. Carnegie Mellon University (CMU), another top CS/ECE university, is not present in Figure 1.

Furthermore, successful generation of license revenue requires vigorous patenting and defense. This costs money. According to [5] (page 13) the "typical" infringement suit costs $1–$3M and lasts about 31 months, "meaning that the validity of key 'foundational' patents in software or business methods, those on which subsequent inventors may rely (and for which they are either paying royalties or risking costly infringement penalties), may take years to be established. In fields that are evolving as rapidly as software, such delays could contribute to high uncertainty, high transaction costs, and impediments to innovation."

To put this in perspective, the UC system reported approximately $73 million[1] in license income in 2001. But after subtracting out legal expenses, operating expenses, distributions to joint holders, distributions to inventors, and other costs, the reported net income is $5.2 million [2].

Blockbuster patents, such as that for gene splicing or taxol, are rare in IT. There are several reasons for this:

- time-to-market is critical in the computing industry, so lengthy license negotiation can kill the utility of an idea;
- most consumer products involve the combined use of hundreds, if not thousands, of patented ideas;
- IT IP is often in the form of fragile experimental software that is relatively poorly documented; creating a stable, integrated and reliable product often requires reconstruction of the software from first principles;
- the reconstruction above often results in changes to the original IP, making it difficult to identify or quantify the value of the original contribution;

[1]The one million dollar discrepancy with the data in Figure 1 is unexplained but the numbers come from different sources.

- because of the issues above, and the complexity of IT IP, informed parties can disagree on whether IP protection was infringed; therefore IT IP is difficult and expensive to protect. Companies take IP infringement issues seriously, because of bad publicity and product delays. So quick and painless licensing policies are often readily accepted.

Contrary to the points made above, there are some blockbuster patents in IT. IBM's patent on the single transistor DRAM and the patent on "the bus" are used constantly. Nevertheless, most of the value of a patent is realized as an anonymous part of a larger patent portfolio and its use in blanket licensing and cross-licensing agreements. The ability of a university to create such a large and significant patent portfolio would be limited by the investment required.

University faculty and patent and licensing officials should recognize the high probability that IT patents are not blockbusters. We were unable to identify a single case of such an IT patent owned by a university.

This issue is further elaborated in the next section.

5 University v Industry Patenting

Universities account for less than 2% of the software patents issued in the United States. This is less than the 3.6% share of overall patents accounted for by U.S. universities. During the 1990s university software patenting declined slightly [5].

Because of the absence of blockbuster patents, companies build interlocking patent portfolios containing thousands of patents. In 1997, IBM obtained 1166 software patents.

These portfolios are used both "offensively" (to force others to pay royalties in order to build products) and "defensively" (to prevent others from blocking the company's products with IP barriers).

Universities have no defensive use of patents: they have no product to defend. Therefore, a university's IT IP portfolio must be used entirely offensively to have immediate cash value. There is a third use of a university's patent portfolio and that is to demonstrate relevance to companies that are potentially interested in sponsored research. This argues for university licensing but not as a means to reap substantial income streams.

6 Industrial Response to IT IP Barriers

Three other aspects of IT research bear noting here.

- The startup costs of a computing company or lab is small compared to, say, a medical center or state-of-the-art biotech research lab.
- Faculty consulting is necessary to maintain currency in computing research.
- Graduate students can earn significantly more in the computing industry as interns, than as university teaching or research assistants.

These facts combine to give industry a relatively cheap way to control the IP generated by their research funding: set up off-campus research facilities and hire CS/ECE faculty and graduate students to work in them as consultants and interns. Virtually all computing companies now make extensive use of both consulting and interns, in part because it simplifies the IP issues: the companies own the IP. From the legal and financial perspectives, the universities are "cut out of the deal," though the quality and impact of the universities' IT research, and the reputation for their faculty and students, is likely to increase through such arrangements.

It is easy to see this trend will accelerate if universities delay contract negotiations over IP issues or insist on onerous barriers to the use of IP generated by industrial SRAs.

institution	SRA income	license income as a percentage of total SRA income
CMU	167,675,342	2.8
MIT	725,600,000	1.7
Stanford	417,037,000	6.2
UC system	1,864,901,000	3.7

Figure 2: License Income as a Percentage of SRA Income

7 The Importance of Sponsored Research

It is interesting to look at the relative importance of sponsored research funding compared to license income. Unfortunately, this information is not available specifically for IT-related research. Instead, we look at data for four of the top computer science universities (in the case of the UC system, we consider UC Berkeley in this top group), but showing results for *all* research at those institutions. The results are shown in Figure 2. The total SRA income includes both government and industrial SRAs. Generally speaking, government contracts account for about 66% of the SRA income below.

When one recalls the relatively low proportion of license income attributable to IT, the importance of sponsored research funding is even more apparent. SRA income is absolutely crucial to university research and especially to IT research.

Industrially sponsored research (as opposed to government sponsored research) is of particular importance to CS/ECE departments both because industry has the data and (sometimes very expensive) facilities faculty need to work on the right problems, and it is through industry that their research has impact. Furthermore, industrially sponsored research is correlated with the economic prosperity of the region around a university:

> Metropolitan areas that have academic institutions performing large amounts of R&D, particularly R&D that is funded by industry, are more able to attract and grow technology companies. [8].

8 Further Supporting Evidence

According to the Director of the UC Berkeley OTL, the university has never issued a license to IBM, HP, or Intel [private communication]. A similar statement holds for Stanford University, according to the Director of the Stanford OTL [private communication]. The Stanford situation changed recently after it created the Epic Program about three years ago. The Epic Program combines into a single portfolio all of the IP generated by the CS/ECE/EE faculty. For fixed annual dues, a company may join the "club" and be permitted, for another fixed fee, to purchase a non-exclusive royalty-free license for any patent in the portfolio. Companies not in the "club" must negotiate for such licenses. The attraction to being in the "club" is that the license can be (essentially) automatically obtained for a predictable price and in a short amount of time. (See http://availtech.stanford.edu/Scripts/otl.cgi/epicsummary.)

The UC system has adopted a different approach to IT IP. In August, 2000, the Office of the President of the UC system announced the Pilot Program. This program essentially exempts CS/ECE IP from the usual licensing policies of the system and authorizes individual contract and grant officers great flexibility, even to the extent of granting royalty-free exclusive licenses to use university IP generated under an SRA.

From [3]

> Recently PEAC (President's Engineering Advisory Council) reviewed the matter of how engineering industry sponsors access University intellectual property resulting from extramural sponsored research. It was observed that the rapid rate of technological change in the engineering fields of electronics, communications technology, [and] computer hardware and software

> results in new products with a typical lifetime of a few years or less. Competitive success rarely is based upon the statutory protection of intellectual property as requirements for conformance with industry-wide standards reduce the value of proprietary technology. Rapid product development and early market entry with innovative products are the keys to market leadership and successful products.

Both administrators and faculty members have said that the expectation is that successful companies exploiting UC Berkeley IP would repay the university's generosity with gifts and participation in fund raising campaigns whose value far outweighs the potential license income.

In the conclusion of [7] the authors write:

> A recent survey of firms in the manufacturing sector indicates that the four most important channels through which firms benefit from university research are publications, conferences, informal information channels, and consulting. Even in pharmaceuticals, where patents and licenses are more important than in other industries, firms rely heavily on these other channels of knowledge and technology transfer.
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> ...
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> First, widespread patenting and restrictive licensing terms may in some cases hamper, rather than promote, technology transfer from universities to industry. These policies may also obstruct the process of scientific research. Second, an administrative emphasis on patenting and licensing may interfere with the operation of other effective channels through which university inventions reach commercial applications.

9 Exclusive versus Non-Exclusive Rights

According to [7], a relatively high fraction of all inventions licensed by universities are licensed under exclusive terms. (In [7] and here, the word "exclusive" in this context is meant to mean either global exclusivity or restrictive as to market or field of use.) For example, up through 1997, 90% of the licenses by the UC system and at least 58.8% by Stanford University were exclusive in this sense. These rates of exclusive licensing hold for biomedical licenses within the respective portfolios. But these rates do not apply to software licenses. For example, only 46% of Stanford's software licenses were exclusive. For Columbia, the university with the highest IP license income, only 17% of the software licenses were exclusive.

Another interesting fact in [7] is

> Nevertheless, the licensing accounting for the largest share of revenues at all of these universities are non-exclusive licenses. The Stanford-UC Cohen-Boyer [gene-splicing] patents were licensed widely and non-exclusively. Columbia University's Axel biotechnology patent was also licensed on a non-exclusive basis.

Universities should act in a way consistent with their primary missions to society: education and the creation and dissemination of knowledge. Undue emphasis on patenting and licensing may interfere with these missions.

10 The Emerging Trend Toward Computational Biology

The premise of this memo is that IT IP is fundamentally different than biomedical and agricultural IP and should be so treated by university OTLs. But computer science research is increasingly focused on computational biology and bio-informatics. Will the nature of IT IP change as a result of this trend?

We do not believe so. While molecules have unique properties and patented algorithms may be used to create them, the biotech algorithms are no more likely to be clearly unique and defensible than other algorithms. For example, a prominent company which has filed for a patent on its bio-informatics algorithm is not exploiting the algorithm for commercial purposes, partly because the company gets good publicity out of the widespread adoption of its once-radical techniques [private communication].

11 Licensing Guidelines

As already noted, SRAs are complex documents, reflecting the differences among universities, as well as the disparity within the various corporate cultures. Furthermore, SRAs are typically negotiated on the university side by the same organization and people that negotiate government research contracts, typically the university's Office of Sponsored Projects, or OSP. But government contracting, IP arrangements and time-scales are fundamentally different than those of industrially sponsored IT research. This can lead to lengthy negotiations by OSPs, which may dilute the value of the proposed research and ultimately drive the potential sponsor away from the project.

In contrast, a university's Office of Technology Licensing, or OTL, typically deals extensively with industrial contracting pertaining to patent applications and the negotiation of license agreements. This gives the OTL a better understanding of industrial priorities and realities. The director of the OTL at one of the top-10 CS/ECE universities indicated that his office was often called in by their OSP to help straighten out contracting obstacles. But, according to him, they were typically involved only after months of delay and misunderstanding that left both parties distrustful and frustrated. "Nothing slows discussions, or raises frustration levels, more than having an inexperienced negotiator who tries to insert unrealistic provisions into an agreement." [6] (page 47).

Stanford University addresses this problem directly: Their OSP negotiates government SRAs and their OTL negotiates industrial SRAs. State universities are usually not so free to restructure their contracting functions.

RECOMMENDATION 1: University OSPs and OTLs should work together from the beginning of an industrial SRA negotiation.

If we now turn our attention to the licensing terms, we first observe that companies do not generally want exclusive licenses to IT IP. Their concern is mostly to preserve their freedom of action, and protect themselves from their exposure to patent infringement created by inadvertent use of IP from the sponsored project in a product.

RECOMMENDATION 2: Universities should assume that non-exclusive licenses for IT IP are sufficient.

Because of the large number of patents involved in the typical electronic consumer product, accounting for the use of each patent in a product is onerous and expensive; so companies do not like royalty bearing licenses. It has been reported [private communication] that over one hundred patents are involved in an inkjet printer that retails for less than $100.

RECOMMENDATION 3: Universities should offer royalty-free licenses for IT IP, perhaps with some upfront fee.

Time is of critical importance to companies, as the shelf-life of IT IP is extremely short.

RECOMMENDATION 4: Universities should have a standard policy, agreed in advance for IT IP, for what would normally be considered generous terms for licensing. For example, a royalty-free non-exclusive license for any IT IP in the university's portfolio may be purchased for a fixed fee. See for example Stanford University's Epic Program.

What should become of IT IP generated by university personnel working under an industrially sponsored research agreement?

RECOMMENDATION 5: The university should grant the industrial sponsor a free, non-exclusive, non-transferable, royalty-free license for internal research purposes to all patented IT IP generated by university personnel working under the agreement. Furthermore, for a fixed annual fee the university should grant a non-exclusive, non-transferable, world-wide, royalty-free license without the right to sublicense (in a designated field of use, where appropriate) for the sponsor to make or have made products exploiting the IT IP.

This recommendation is essentially one of the options provided in MIT's "standard research agreement" (where the fixed fee is $3,000). This may be formalized with a program similar to Stanford University's Epic Program.

Note that the recommended license is non-transferable. Typical initial contract proposals from the industrial side make the license transferable while typical initial proposals from the university side make the license non-transferable. But the same of actual agreements most often strike a compromise in which the license is non-transferable except possibly to some carefully defined subsidiary or partner of the sponsor in order to produce and commercialize the product.

The most important conclusion of this paper is embodied in the following recommendation.

RECOMMENDATION 6: University OSPs and OTLs should recognize the unusual nature of IT IP and the crucial role industrial connections play in the creation and dissemination of knowledge in the areas of computer science and electrical and computer engineering. Such considerations must be made in evaluating the value and impact of a proposed IT patent and licensing policies on the university's ability to perform its mission.

12 Recommended Model Clauses

Recommended model language for clauses dealing with IT IP in industrially sponsored university research agreements is given in the following. Although the authors of this memo are not lawyers, a lawyer helped draft the words, using the eleven sample SRAs made available to the committee.

These clauses are consistent with those in the actual agreements and the dollar amounts below are suggestive of the amounts seen in actual agreements. The wording is not, however, a substitute for the advice of an attorney.

12.1 Rights to Inventions

Joint Ownership: Sponsor and University jointly own all right, title, and interest in intellectual property conceived or reduced to practice jointly by one or more employees of Sponsor and one or more employees and students of University in the performance of the Research. Each joint owner can independently administer its ownership rights without accountability to any other joint owner, except as described in this Agreement.

Sole Ownership: Sponsor or University will solely own all right, title, and interest in intellectual property conceived or reduced to practice solely by one or more employees of Sponsor or by one or more employees and students of University respectively.

12.2 Licensing

Jointly Owned: Sponsor may obtain from University an exclusive, worldwide, fully paid-up license to any jointly owned intellectual property produced in the performance of the Research for a $10,000 fee each.

(Note: A similar clause is found in only one of the actual agreements. Another has a provision to negotiate an exclusive license without specifying a fixed fee. The others show little interest in exclusive licenses.)

Solely Owned by University: In consideration of Sponsor's payment of the agreed Research, Sponsor has a non-exclusive, non-transferable, royalty-free license of intellectual property conceived or reduced to practice under this Agreement for internal research purposes only.

Sponsor may obtain from University a non-exclusive, worldwide, fully paid-up license to any solely owned intellectual property of University produced in the performance of the Research for a $4,000 fee each.

Alternatively, University will grant to Sponsor a non-exclusive, worldwide, fully paid-up license to any solely owned intellectual property of University produced in the performance of the Research in consideration of Sponsor prepaying a single fee of $10,000.

(Note: An alternative may be to waive the two fees mentioned above if the amount paid for the research exceeds some threshold, e.g., $100,000, as is implied by one of the actual agreements. The rationale is that for SRAs under that threshold, fixed university overheads eat into the research allowance more significantly.

Sponsors tend to want the IP issues settled up front for predictable costs; this alternative allows them to roll the licensing fees into the research costs and may encourage larger SRAs.)

Sponsor may obtain from University a non-exclusive, worldwide, fully-paid up license to any solely owned intellectual property not under the Research but required to exercise rights to the intellectual property produced under the Agreement (i.e., "background IP") for a fee of $10,000 each.

13 Conclusions

This memo attempted to debunk the belief, widely held by university commercialization and licensing officials, and shared by some faculty in Computer Science and Electrical and Computer Engineering departments, that Information Technology (IT) Intellectual property (IP) can be a significant source of licensing income. To do so, it showed that the overall licensing income from IT IP in four of the top CS schools in the United States amounts to very little, and it dwarfs in comparison to the amount of funding flowing to the same schools through industrial-university sponsored research agreements (SRAs). Thus, it makes sense to simplify access to the IT IP created under SRAs, to foster closer university-industry collaboration. To do so, we presented model language on which SRAs could be based.

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