

Technology Transfer: Licensing Intellectual Property from Universities to Industry

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Abstract

Universities produce a large amount of groundbreaking inventions every year and are among the best sources of intellectual property (IP). The growing portfolio of companies who have successfully utilized university technology suggests that benefits may be gained from an insight into the nature and process of university technology transfer.

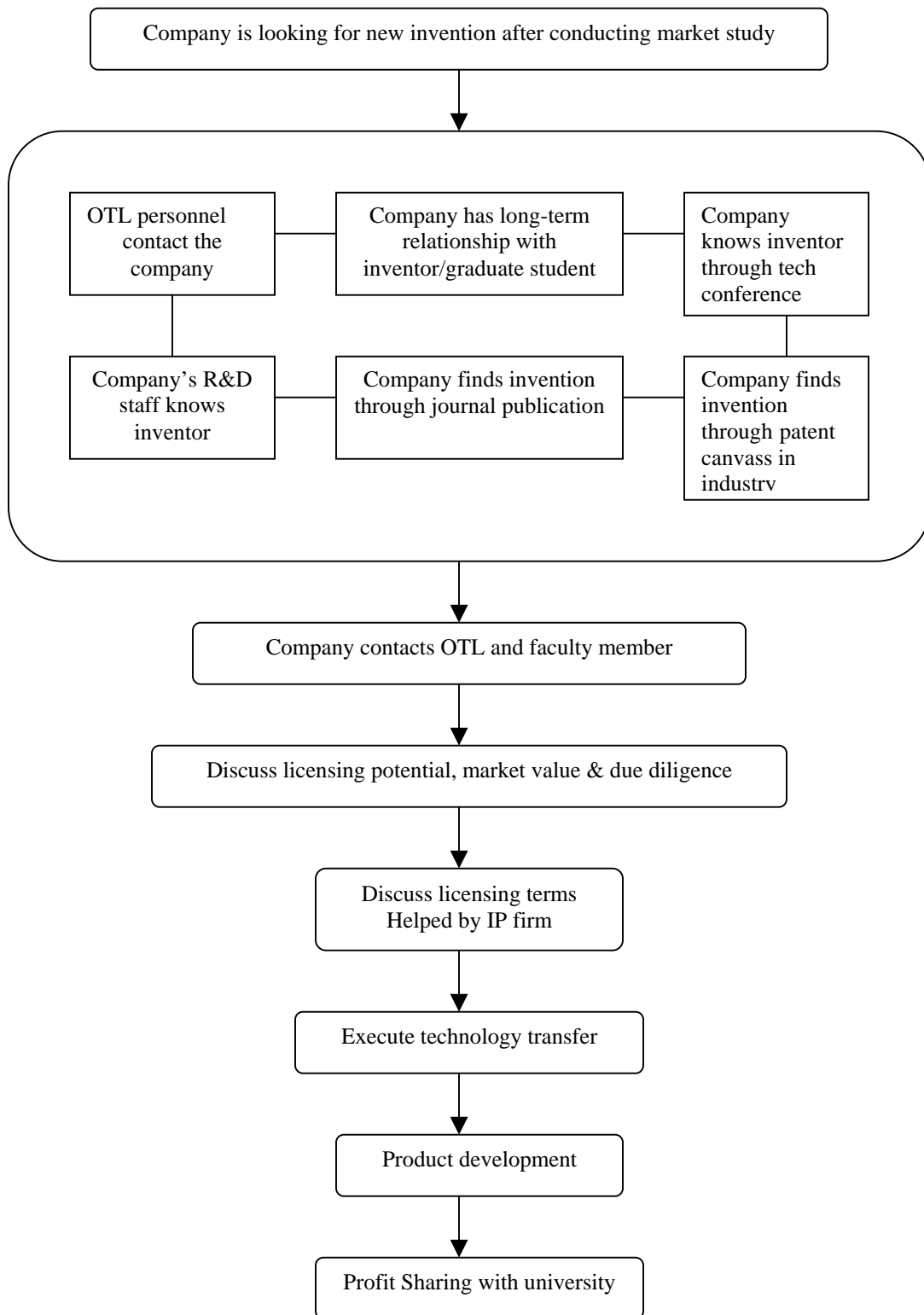
We present an overview of university tech transfer and approaches for finding and accessing university technology, point out potential pitfalls for a technology company looking to bring the power of university research to fruition in its products, and illustrate typical licensing terms and different types of licenses.

Overview of the Technology Transfer Process

Technology transfer is the process of transferring discoveries and innovations resulting from university research to the commercial sector and typically comprises several steps. The process starts when a faculty member, graduate student or staff (i.e. inventor) of a university submits an invention disclosure to the university's office of technology licensing (OTL). The OTL is the office that handles legal matters involved in the university's intellectual property (IP). The OTL typically evaluates the invention's economic prospects and decides whether to protect the IP by securing a patent, copyright or trademark or by keeping the invention a trade secret. Patenting is often done concurrently with the publication of the research results. Since inventions made using university resources are owned by the university, the inventors in effect assign the rights to their intellectual property and the university is free to license the technology to interested parties. The next step occurs when an individual or organization, usually a commercial company, secures a license to commercialize the technology. A license does not technically grant a company the right to make, use or sell the invention, but it is an agreement for the university not to sue the company for patent infringement. The license source can be in the form of a patent, copyright, trade secret or trademark.

A non-confidential document summarizing an invention is sent by the OTL to interested companies for a review process, with the OTL requesting a signed confidentiality agreement prior to a full disclosure. Upon further interest, the university and the company may proceed to negotiating licensing terms. At this stage, the university typically requires the prospective licensee to submit a development plan and a corresponding letter of intent. After a due diligence process and the execution of a licensing agreement, both parties may start earning income from the transferred technology. While this may sound fairly simple, the actual process is often complicated in practice.

Figure1. Company's View of University Technology Transfer Process



Finding and Accessing University Technology

There are several approaches for identifying appropriate university technology. A frequent example comprises company R&D staff who happens to be familiar with the work of a particular university research group and finds the involved technology suitable for product development. A survey of industry licensing executives¹ identifies personal contacts between university inventors and industry as the most important source of successful university tech transfer, usually between an industry's R&D staff and university personnel. Thus, establishing contacts in universities (either with inventors themselves or through alumni who may now be working in industry) represents a significant starting point for successful technology transfer. By establishing and nurturing such a relationship, a company may develop an ongoing awareness of the university research activity while the research group gains an efficient channel for marketing new results. It is interesting to note that a shift to more applied research and an increasing number of research programs targeted to specific licensing opportunities has already occurred at several prominent research universities including Columbia University, the University of California and Stanford University.²

Developing a relationship with relevant research experts in universities may begin by establishing personal contacts in universities during related technical conferences, or by building a longer history of interaction with faculty by industry sponsorship through research grants and contracts. Graduate students or university alumni who have completed their degrees and have taken positions in industry are another major source of researchers' contacts.

Patent searches and a routine canvassing of available university technologies present another important source for tech transfer leads. Technology transfer offices generally offer online resources which the industry may use to search for licensing opportunities related to a given business. After identifying a targeted technology a company may directly contact the appropriate licensing officers and faculty members.

Issues in University Technology Transfer

Universities have licensed their new technologies to a broad spectrum of organizations and individuals ranging from large for-profit corporations to small non-profit research institutes and early stage firms whose sole founding purpose is to commercialize and gain profit from new inventions. While the latter class of licensee sounds the most risky in terms of eventual payoff, early-stage firms have proved to be the most effective in transferring technology for public benefit and have been fairly successful in generating income because of their strong desire to make the technology a success and, sometimes, because of entrepreneurial inventors' involvement in all stages of product development and licensing process.

However, university tech transfer is not always a straightforward endeavor and there are potential conflicts that companies must be aware of. Some licensing executives count the nature of university research as the³ main factor for not licensing-in university inventions: the research is either at too early a stage of development or it is not relevant to the firm's business objectives. Other reasons relate to university policies, such as a university's prompt research publication requirements versus a licensee's preference towards secrecy of invention resulting in publication delay. Still other reasons include industry's concerns about faculty cooperation for further development, difficulties in dealing with universities (such as their non-business minded culture), universities' preference not to work with small firms due to lack of financial and legal security, complexity of licensing deals and high licensing fees.

The embryonic and sometimes arcane nature of university research results in the fact that only a small portion of results has the potential to be commercialized or to solve current practical problems. Entrepreneurs are therefore required to be creative in seeking out inventions that can be implemented as part of their product development and aligned with the business plan at hand. Currently, 70%⁴ of total

¹ AUTM Journal Volume XII (2000): *Industry Perspectives on Licensing University Technologies: Sources and Problems* by Jerry G. Thursby and Marie C. Thursby

² AUTM Journal Volume XII (2000): *Assessing the Effectiveness of Technology Transfer Offices at U.S. Research Universities* by Everett M. Rogers, Jing Yin & Joern Hoffmann

³ AUTM Journal Volume XII (2000): *Industry Perspectives on Licensing University Technologies: Sources and Problems* by Jerry G. Thursby and Marie C. Thursby

⁴ AUTM Journal Volume XII (2000): *Assessing the Effectiveness of Technology Transfer Offices at U.S. Research Universities*

university transferred technology comes from life sciences, with the remainder coming from physical sciences or engineering.

Inventorship presents another point for scrutiny when planning to invest in an invention associated with university research. Invention ownership should be properly documented and handled by all parties involved, namely the inventors, the OTL and the prospective licensee. The licensee may accompany the inventor to the OTL in order to get clear and correct legal information regarding ownership of the invention.

Other potential pitfalls include financial conflicts, such as the university's expectation to earn royalties in excess of the value a given technology can realistically add to the revenue of the company, the requirement of large initial payment particularly for small companies that do not have sufficient cash flow, and the possibility that the licensing costs involved may inflate the retail price of the product beyond what the markets can support.

Another consideration a company must make when deciding to acquire intellectual property through licensing is whether the licensor will be capable of fulfilling its financial obligations to the licensee and whether, if additional support may be required later on, the licensor will have sufficient resources to further enable the licensee's development and production. Therefore, most licensing agreements, especially for new technologies, include a "Know How and Show How" provision that requires the inventor to devote a specific amount of time to the start-up phase of the new technical project.⁵

A culture gap between academia and industry sometimes contributes to a potential for conflicts. While the industry generally strives for profits, is willing to take risks to maximize goals, often strongly protects IP rights and must respond fairly quickly to problems, academic life demands that the faculty emphasize education and service, avoid risk to maintain mission, freely exchange ideas and make decisions carefully through sometimes lengthy committee procedures. Encouraging faculty members to participate in the process of patenting and marketing a technology may present one way of promoting university IP protection, generating alternative sources of research funding, presenting commercialization difficulties as research topics and generally building a licensing relationship which would benefit both industry and university researchers.

Whether or not federal research funds are involved, a university will insist on licensing terms that require the company to be diligent in developing the invention. If the company does not comply, especially in the case of an exclusive license, the university generally reserves the right to terminate the license or to grant licenses to other companies. Therefore, a company under an exclusive license is generally obligated to develop products covered by the licensed technology. This is one of the reasons why exclusive licenses are the key catalysts of new product development from university-transferred technology and attract more investments. In this way, the university can prevent a company from "shelving" an invention that might otherwise replace or compete with one of the company's existing products.

About 15% of NIH/NSF-funded inventions are now licensed to foreign companies or U.S. subsidiaries of foreign corporations, and foreign corporations are well advised to pay special attention to their licensing agreements, especially for exclusive licenses involving federal U.S. funds. For some technologies (such as paper drying equipment) foreign companies represent the only prospective licensees. One example issue here is that all exclusive licenses obligate the licensee, including foreign companies, to manufacture products substantially in the U.S., which may or may not be in the interest of the foreign licensee. A number of other stringent regulations exist for foreign investors.

It may be appropriate at this point to point out that income from licensing is fairly small in comparison to a university's total budget, or even in comparison to a university's sponsored research budget. Even at universities with the greatest amount of licensing income this percentage is only around 3-5%, and at most universities only around 1-2%. Universities' royalty generally income flows back into research and teaching. According to federal law, universities must also share their royalty income with the inventors. While the specific percentages vary from institution to institution, a typical royalty sharing policy provides, after tech transfer and other expenses, about 1/3 of the net income to the inventor, 1/3 to the inventor's department, and the final 1/3 to the university's general research fund.

⁵ Woodbridge, R.C. October 2007. *How To Negotiate a Strong Patent License*.

Licensing Agreement Terms

In addition to the common licensing agreement, a company may negotiate an industrial contract after reviewing the invention disclosure. This could be in the form of a material transfer agreement⁶, a collaboration agreement, a master agreement or a sponsored research agreement during the early stages of research. The company may feel that the invention has the potential to solve practical problems and create new or better products but is currently at a too early a stage and needs further development, and that collaboration with university researchers and guidance from the company would ensure a smooth and efficient technology transfer process. In such a situation the involved funds and expertise may benefit all parties.

The amount of licensing fee or royalty is case-specific and decided based on the type of technology, its stage of development, the size of the potential market, the profit margin for the anticipated product, the strength of the patents, the estimated dollar value that has led to the discovery, the projected cost of development needed to complete the product, the scope of the license (nonexclusive vs. exclusive; US vs. worldwide; narrow vs. multiple fields of use; etc.), royalty rates for similar products, and the expected cost of bringing the product to the market.

A company may take into consideration that the inventions at hand are embryonic and require further research and development before they are ready for the marketplace, thus arguing for a reduction of the licensing fee or royalties based on an increased level of risk involved. Licensing fees generally range from a few thousand to a few hundreds of thousands of dollars. Royalty rates range from 1% for processed technology to about 10% for a patent with direct or significant market commercialization. The majority of the rates are between 3% and 6%, depending on net sales. However, the term “net sales” has to be defined clearly in order to avoid conflicts.

Some universities, such as the University of California, require licensees to reimburse patent application legal fees. Some universities will have license issue fees and require companies to pay for ongoing expenses in research and development. Universities may also set a minimum annual royalties payment after a specific period of time, regardless of actual sales. Others may include terms ensuring the university’s right to acquire the technology back should the company perform below a predetermined performance target or fail to pay the minimum fee, especially in the case of an exclusive license. Universities may also require progress or marketing reports during the licensing period, with a preference for post-sales information.

In general, however, keep in mind that licensing terms are case-specific, negotiable and vary from institution to institution. Some universities such as Caltech give licensing preference to start-ups,⁷ both to avoid the possibility of a big company’s shelving of the technology and to increase commercialization of the technology. Caltech rarely asks for up-front payment fees (especially from a start-up), allows for options giving entrepreneurs time to raise money, accepts equity as an up-front payment and does not require reimbursement of patent legal fees. Stanford, which prefers cash instead of equity as an up-front payment, is also willing to take risks by offering options, and offers the possibility of lower up-front fees by emphasizing subsequent royalties. Stanford also asks for licensing terms renegotiation every two or three years with the view that renegotiation promotes licensing success and a better long-term relationship.

Types of Licensing Agreements

Long term vs. short term

A long-term license is usually more beneficial if the licensee is a small company with limited cash. The amount of initial payment is usually relatively small, such as in the range of \$1-\$1K, with subsequent royalty payments forming the greater part of the financial compensation, usually after the company earns the bulk of money from the technology.

In contrast, a company that prefers to pay for a license in cash instead of equity may find a short-term agreement useful. In a short-term license, the greater portion of the compensation is made via an initial payment, such as in the range of \$1-\$1M. In rarer cases this payment will include an infringement fee.

⁶ Stanford University Industrial Contracts Office, Types of Contracts. Available at <http://www.stanford.edu/group/ICO/agmts/index.htm>

⁷ Accessing University IP event

Exclusive vs. Non-exclusive Agreements

A non-exclusive agreement allows more than one company to utilize the licensed technology while an exclusive agreement allows only one company to license the invention. A non-exclusive agreement may be mutually beneficial for the university and the company in terms of reducing potential conflicts that might arise and mitigating risks for both parties. Lower licensing fees and reduced royalty fees reduce the cost of the product, which in turn can increase market opportunity, and the licensor is consequently not dependent on the success of one particular product. Both parties can also benefit from improvements made by other licensees.

A wise stance for companies electing non-exclusive licenses is to disclose a minimal amount of information when dealing with the university in order to prevent potential competitors from learning strategic directions that the company might take in the future. In addition, the company should consider whether it is advisable to select licenses through a competitive bidding process, as other competitors might become aware of the company's strategic direction. The decision to license on exclusive or non-exclusive basis is inevitably driven by market interest, which relates to the value and field of the technology, the associated risks and the investment required to develop the new products.

Although engagement in an exclusive license generally results in more stringent agreement terms, it represents one way a company may secure a unique technology as part of its enterprise. As a compromise, a "field-of-use" license may prove beneficial for both university and company as it protects the company's competitiveness while allowing the university to license to more than one licensee. In the case of technology developed under federal funding, a university may be required to give licensing preference to small companies, in which case engaging in a research agreement and tailoring the research to the company's needs may prove very beneficial.

In physical sciences where technology is developing rapidly and exclusivity is highly sought, a limited period of exclusivity might be the best choice for both parties involved since such an agreement will guarantee a competitive advantage for the company while allowing university to broaden the commercialization of the invention. For life sciences with lengthy research periods, the university may be selective and choose a company that shows a promise to successfully implement the technology before the expiration of the patents.

Companies should be aware that products covered by exclusive licenses generally take longer to develop than those under non-exclusive licenses. Many products under exclusive licenses do not achieve significant sales until 5-10 years⁸ after the license agreement is signed. However, exclusive licenses may eventually generate more lucrative business opportunities and higher revenues as the sales of exclusive products tend to be larger than the sales of non-exclusive products.

An exclusive license is also encouraged for early stage research. Such a company typically invests substantial money and resources to reach several milestones prior to development of a finished product, but will be rewarded with the exclusive rights to market such products under the license. Conversely, companies that are already using a technology or making products covered by a license usually choose non-exclusive agreements, due to unwillingness to commit to the complexities of exclusive licenses. Currently, exclusive and non-exclusive licenses are present in about the same proportion.

It is imperative for a company to clearly specify in the licensing agreement the proprietary rights of improvements made to the technology during the licensing period. Needless to say it is beneficial to the licensee to gain rights to any improvements made by the licensor. Furthermore, if the license is non-exclusive, there should also be procedural terms regarding improvements made by other licensees. The license agreement may stipulate a payment to be made by either side in return for intellectual property rights for the improvements, or the rights could be granted free for one party.

Another business strategy would be to sublicense to other parties, which is allowed unless the agreement specifically states otherwise. However, the licensing party should be aware that it may lose direct control over the technology, therefore any terms regarding improvements should be clearly stated in the sublicense agreement.

The terms of license agreement are the most important aspect of the licensing process. A company must look carefully at these terms, negotiating with the licensor until all legal, financial and scientific issues are resolved and articulated to the satisfaction of both parties. An effective licensing

⁸ Pressman, Lori & D. Kaiser. *Measuring Product Development Outcomes of Patent Licensing at M.I.T.* Available at (<http://web.mit.edu/afs/athena.mit.edu/org/tlo/www/AAAS.pdf>)

strategy will minimize risks for both parties while the terms of agreement reflect the nature of the company's business and the aspects of the technology the company wishes to utilize.

An industrial licensee should also research on prior art before entering into a licensing agreement in order to ensure the deal's security and maximize the chances of a patent issuing on the broad underlying concepts. Inventions in nanotechnology in some cases are smaller versions of existing inventions, and applicants might have to argue that the smaller version is patentable (such as in transistor inventions) in order to obtain the patents. Even though some U.S Patent and Trademark Office examiners have argued that a mere change in size cannot fulfill the "novelty" requirement under the U.S. patent law, patent attorneys heed historical precedent. In the semiconductor industry for example, scientists continue to patent scaled-down versions of transistors.

Conclusion

University technology transfer offers substantial benefit for companies seeking a greater competitive advantage. The acquisition, negotiation and management of such intangible assets represent a critical capability for companies expecting higher return opportunities. An understanding of the basic tech transfer process, different licensing terms and potential pitfalls will help company management secure an agreement that is aligned with the business model and strategic vision at hand.

Standard Terms in a University License Agreement	
TERMS	EXPLANATION
Definitions of:	The technology being licensed or licensed products or processes Field of Use Territory Net Sales Licensee and affiliates
Grant of License	Exclusive vs. Non-Exclusive Field of use (e.g., therapeutic only, veterinary only, etc.) Territory (worldwide vs. US only, etc.) Sublicense rights (e.g., can the licensee sublicense the technology) Reservation to the university that it can use the technology for research or academic purpose Reservation of rights to government
Consideration	License fee Equity (especially if licensee is a start-up company) Royalty on net sales by licensee and its sublicensee (sometimes royalty per product sold) Percentage of non-royalty sublicense income (e.g. sublicense fees) Minimum annual royalties or maintenance fees

	<p>Milestone/diligence payments</p> <p>Assignment rules and assignment fees</p>
Patent Prosecution & Payment	<p>University usually controls the patent prosecution and provide licensee the opportunity to make comments, prosecution strategy, which countries to file, etc.</p> <p>Licensee reimburses the university for licensed patent costs</p>
Reporting	<p>University typically requires quarterly or annual reporting & payment schedule</p> <p>Royalties due, sublicense agreements and payments, other revenues, etc.</p> <p>Audit rights and procedures</p>
Diligence or Milestone Terms	<p>Certain diligence milestones set by university to ensure the technology is being diligently developed and commercialized</p> <p>Products diligence terms: first product prototype, product available for sale, first commercial sale</p> <p>Funding, management team, net sales, etc.</p>
Sublicense Provisions	<p>University will require all sublicense agreements contain some of the same language as the original license, such as: use of the university name, disclaimer of warranties, maintenance of university rights, product liability, confidentiality, and termination</p>
Infringement	<p>Who will have the first right to enforce the licensed patents</p> <p>Who pays the expenses</p> <p>Distribution of damages between licensee and university after enforcement expenses</p>
Representation & Warranties	<p>Licensee assumes all risk associated with the licensed technology</p>
Limitation of liability	<p>University will not make any warranties as to the fitness, merchantability, validity of patent rights, etc.</p>
Indemnification	<p>Licensee will indemnify university against all</p>

	claims, proceedings, liabilities of any kind whatsoever. Licensee is required to obtain certain amounts of product liability insurance prior to commercial sale of a product.
Term and Termination	Duration of licensed patents Licensee should give advance notice of termination to university University can terminate for breach Terms of sublicenses after termination Dispute resolution between both parties
Notices	List of contact information for both parties Requirement for communication (overnight mail, fax, etc.)
Miscellaneous Provision	Marks of patent numbers at all products sold in the U.S. Prohibition on using university's name in any publicity or advertising without its written consent Agreement that licensee will comply with all applicable laws and regulations

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