Interfaces With Technology Transfer

How one company established relationships with external sources, such as universities, for technology

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The existence of a correct interface between a company and its external environment can facilitate the transfer of technology from that environment into the company for its benefit. This paper will discuss the general problems of interfacing to accomplish technology transfer and G. D. Searle's solution to those problems.

The following table shows the estimated funds and performers for applied research and development in 1971 in the U.S.[1]

ESTIMATED FUNDS AND PERFORMERS FOR APPLIED RESEARCH 1971
(Millions of Dollars)

	PERFORMERS			
Sources	Fed. Agencies	Industry	Univ.	Non profits
Fed. Agencies	3,260	7,590	370	520
Industry		10,065	22	75
Universities			227	
Other Nonprofits			56	145
	3,260	17,655	740	740

One can see that the dollar amount spent on Applied R&D in universities was equivalent to that spent by nonprofit research institutes, such as Mellon, Battelle, WARF, and IIT. Universities have begun to market the results of this R&D more aggressively and you have heard of past successes such as Vitamin D irradiation, Warfarin — the anticoagulant and rat poison — and, of course, the toothpaste additive recommended by four out of five dentists, stannous fluoride.[2]

Companies now recognize the importance of technology transfer and some are utilizing local academic talents to accomplish it. An example is the MIT industrial liaison program. Another is the university-industrial personnel consulting arrangement, which has been prevalent for many years in the health-care industry and is now becoming more prevalent in other types of industries. Allied Chemical recently announced the formation of a new venture development department which will utilize external technology.

There are many barriers to technology transfer, including:

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1. Goal conflicts.
2. Time conflicts.
3. Lack of incentive structure both in industry and universities.
4. An individual's high risk of being blamed for failure.
5. Geographic distance.

From the LES U.S.A. Meeting

6. Technology barriers.
7. Inertia barriers.
8. Mutual disrespect.
9. Lack of technology transfer managers.

Many of these barriers are developed and discussed more fully in references.[3]

Though universities have for a number of years maintained licensing departments, it is now recognized that a much more directed effort with a formal structure is needed if companies are to benefit from technology transfer. Technology transfer can be viewed as a process which involves a mating of technology with needs by means of a licensing system. This process of transfer has been identified by the Committee on Technology Transfer and Utilization as consisting of the following steps:

1. Collecting, organizing and storing of R&D results, i.e., the technology.
2. Publishing and disseminating the technology.
3. Identifying the need and evaluating technological requirements to satisfy that need.
4. Matching of available technology with specific needs.
5. Defining market potential and economic benefit of the technology.
6. Determining the resources and requirements necessary to produce a product, service or process.
7. Agreeing on goals.
8. Performing adaptive engineering necessary to develop the product.
9. Formulating a business plan to determine marketing, production, etc.
10. Acquiring the necessary financing.
11. Implementing the business plan.

Many studies done on technology transfer have shown that successful technology transfer into a company usually centers around an individual who will perform the day-to-day activities of technology transfer.[4] Other studies have emphasized the overwhelming importance of personal contact.[5] These contacts are shown to be more effective than any printed information utilized for disseminating technologies.

At G. D. Searle & Co., day-to-day technology transfer performance was recognized, and the Corporate New Business Opportunities Department was established. This

department's responsibility is to establish personal contact with groups external to Searle's environment, such as universities, and facilitate the transfer of interesting technology into Searle. This group is responsible for the steps that have been identified as belonging to all technology transfer processes — that is, steps 1 to 10 of the process earlier defined by the Committee on Technology Transfer and Utilization. In order to perform the first eight of the ten steps described earlier an information systems approach is used.

The internal system is called the Corporate Extramural Project Proposal (CEPP) System. It is a communications system established to inform operating divisions worldwide of a product, process, or technology available to Searle. It allows each division to express an interest or lack of same to relevant product suggestions and technology coming from outside the corporation. These evaluations are provided by area coordinators representing and working with their respective operating divisions. The area coordinators are responsible for collecting and summarizing the responses of the key men in each area and for transmitting these responses to the administrator of the system.

The communications system can be divided into three distinct processes: No. 1 is the entry process; No. 2 is the abstraction and dissemination process; No. 3 is the follow-up and closure process. These three processes are shown in Figure 1.

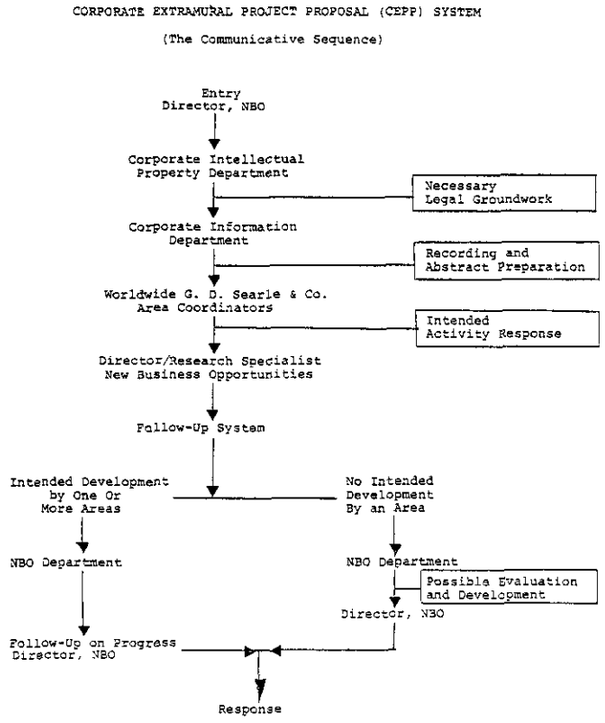

Fig. 1

During the entry process the technology/product suggestion is submitted for evaluation. It can originate from outside the corporation or internally. The administrator of the system retains the information and with the aid of the Corporate Intellectual Property Department negotiates a confidentiality disclosure if one is needed. After agreement is reached and the disclosure agreement is signed, it is sent into the second process — information abstraction, duplication, and then dissemination. The Corporate Information Department performs these three tasks. First, they prepare and abstract all of the information forwarded to it, including as many types of information elements as possible in the abstract. This abstract is placed on the upper part of a single 8 1/2" x 11" page with the proposal name, file number, and date that the suggestion was duplicated. It is then sent to the area coordinators. This preparation is done within 24-hour turnaround time. This group also maintains a complete file of each project. (See Fig. 2).

TO: DATE:

SUBJECT: OPPORTUNITY DESCRIPTION SHEET

PROPOSAL NAME:

PROPOSER NAME: CEPP NUMBER:

.....

DESCRIPTION:

FILE CONTENTS:

.....

RESPONSE: Please check the appropriate box below, make comments, copy for your files and return to Director, New Business Opportunities Department (N. A. Romeo), within two weeks.

I. Intended Activity
☐ Will assume responsibility for evaluation.
☐ Cannot evaluate or develop this opportunity at this time.

II. Information/Interest
☐ If you have relevant information/expertise on this opportunity, please furnish in summary form.
☐ If you have interest in being kept informed re this opportunity, please write, indicating nature of your interest.

III. Additional Comments (Use other side if needed).

Fig. 2

The third process is the follow-up and closure action by the New Business Opportunities group. That is, after receiving the response of the area coordinators, if no interest is generated, the project is terminated after review by the administrator. If follow-up is needed, the New Business Opportunities (NBO) Department will coordinate follow-up between divisions which showed interest. Other members of the NBO Department are utilized in the follow-up process to develop and administer business plans and planning described by steps 8 through 10 of the Committee on Technology Transfer and Utilization. They coordinate with members of the division who expressed an active interest and whose primary responsibility it is to develop the technology or product. Because of their interfacing role, all members of the NBO Department have dual backgrounds in science and business administration.

In the case of no division having an interest in the development of a desirable technology or product, one of the NBO personnel becomes the program manager. He must develop a plan including market research, financing, business planning, law and patent protection, production

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574 (6th Cir. 1968) cert. denied, 374 U.S. 920 (1969).
14. *American Cyanamid Co.*, 63 F.T.C. 1747, 1891 (1963).
15. See, e.g., *General Railway Signal Co.*, F.T.C. 882 (1964); *Standard Oil Co. (Indiana)*, 74 F.T.C. 141 (1968); *Swingline, Inc.*, 76 F.T.C. 407 (1969); *Occidental Petroleum Corp.*, 77 F.T.C. 710 (1970); *Koppers Co., Inc.*, 79 F.T.C. 837 (1971); *Rockwell International Corp.*, 84 F.T.C. 79 (1974); *Walter Kidde & Co.*, Docket No. 8957 (consent order accepted June 29, 1976).
16. *Xerox Corporation*, Docket No. 8909 (consent order accepted July 29, 1975).
17. *Borden, Inc.*, FTC Docket No. 8978 (initial decision filed August 8, 1976).
18. *Id.* at 165.
19. See, e.g., *United States* v. *Wallace & Tiernan Co., Inc.*, 1954 Trade Cas. ¶67,828 (D.R.I. 1954); *United States* v. *A. B. Dick Co.*, 1948-49 Trade Cas. ¶62,233 (D. Ohio 1948).
20. See Rushefsky, *FTC Section 5 Powers and the Pfizer-Cyanamid Imbroglio: Where Do We Go From Here, or "You Ain't Seen Nothing Yet,"* 18 Cath. U. L.Rev. 335, 347 (1969).

Research to Realization Via the Campus

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building suit, to negotiate with Random U, you and they will begin with two essential factors clearly established. These are:

1. The University Licensor absolutely requires the cooperation of some company to develop and market the product or service.
2. The Licensee will be risking substantial time and money on a relatively unproven invention.

The type and details of the license bridge that ultimately rests on these principles will vary with the other circumstances. You will want the technology to:

1. Be fairly priced.
2. Be exclusive for as long as possible.
3. Be patented or patentable.
4. Have a high return on overall investment.
5. Have cost as little as possible in case at some future point you change your mind.

The licensor will want the licensee:

1. To insure diligence in his development and marketing efforts.
2. To return rights in the invention if the project is not pursued.
3. To accept a limited term of exclusivity so that he can expand the market if the licensee does not.
4. To pay a royalty which recognizes the licensor's willingness to wait for a return until sales can generate it.

At WARF, we believe that the licensee usually should:

1. Have the right to terminate the agreement on notice.
2. Not be expected to make minimum royalty payments until sales begin, and then on a graduated scale.
3. Invest its capital in the development rather than in large front-end payments.

We expect the licensee to prepare a development schedule or PERT chart to be made a part of the agreement, with periodic reporting by means of which his progress can be monitored. We do not grant life-of-the-patent exclusive licenses.

These are the key supporting girders. The rest of the bridge will be built by carefully listening to the needs and fears of each party and placing only sufficient structure to handle the problems.

There is one other major reason why licensing is uniquely suited to the long-term relationship which must be sustained if a new product is to get to market in this day of intense governmental regulation. That reason is *change*. No one can foresee clearly the outcome of a four-to-eight-year development effort. A license agreement based on a mutual understanding of each party's fundamental importance and desire to maintain the bridge can absorb change and evolve with time to provide a workable relationship between the parties.

SUMMARY

I would summarize the case for acquisition of university research through licensing as follows:

1. By utilizing the university discovery that fits your marketing and production skills, you have conserved your R&D efforts for those more predictable, present product-related goals. You have not had to support the uncertain, long quest for a truly different product, i.e., your costs have been reduced.
2. Through the licensing route, you delay payment for the research until after you have established that the product is both producible and marketable. Your royalty payments will be fixed, known costs, and will be earned for you by your customers.
3. Licensing helps both parties to the arrangement avoid those differences in expectation which could stalemate other means of acquisition.

Remember, most universities have established the means to help you locate their technical advances. In many cases, their experienced licensing officers will already understand many of your concerns and questions. You, as licensing executives, are trained in the use of one of the most flexible and useful contract forms to help you obtain that technology on a fair and equitable basis.

When will you begin?

Interface With Technology Transfer

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and commercial development. He must convince corporate management of the viability and desirability of the project and acquire the necessary internal financing to implement the project.

The information system is monitored by management at Searle through a bimonthly status report which is sent to the executive committee and other interested parties. The status report contains a list of those projects in development, in advanced evaluation, in primary evaluation, and termination. Of approximately every 100 projects entered into the system, 90 are dropped after initial evaluation and 10 are evaluated in greater depth. Of those 10, one will make it into the development stage and be financed. The experience at Searle has been very similar to that shown to be the case in other companies, as far as number surveyed versus number developed.

In conclusion, if one takes care in structuring a company interface group, the problems associated with transfer of technology into the company from external sources, such as universities, are minimized and the benefits and efficiencies are maximized.

NOTES
1. Granville W. Hough, *Technology Difussion*, Lomond Books, 1975, pp. 38-45.
2. "Universities Promote Sale of Technology," *Chemical and Engineering News*, March 12, 1973, p. 29.

3. "Barriers to Innovation in Industry: Opportunities for Public Policy Change," Executive Summary, National Science Foundation, Contracts C-748 and 725, September, 1973.

"Technology transfer and Utilization, Recommendations for Redirecting the Emphasis and Correcting the Imbalance," National Academy of Engineering, National Technical Information Service, U.S. Department of Commerce, February, 1974.

4. D. A. Schon, "Champions for Radical New Inventions," *Harvard Business Review,* March-Aril, 1963.

M. Anbar, "The Bridge Scientist and His Role," *Research/Development,* July, 1973.

5. T. J. Allen, *Institutional Roles in Technology Transfer,* Liaison Program, MIT, March, 1973.

Meeting Importing Countries' Needs

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I must note that INFOTEC's services have been very useful for the National Registry of Technology and for the Registry of Foreign Investment, both of which are part of the Ministry of Trade and Industry. The Director of the Registry of Technology is the Ministry's representative in INFOTEC's Board of Directors.

INFOTEC has supplied information on request to the Ministry of Trade and Industry, about technological alternatives, alternative processes, machinery and equipment manufacturers, utilities, and technology trends. This information has been used to renegotiate license contracts and foreign investments. In these cases information has been used as a tool to increase bargaining capacity.

4. *Consulting*

The fourth and final service offered to industry is consulting in setting up internal technical information departments or divisions. The idea is to establish a system which has an information department as its core, and which employs participative process, with professionals and technicians capable of understanding technical information, to select, analyze, and apply knowledge in manufacturing operations, in research and development, and in long-range planning. This program has been highly successful.

How ITT Helped the Pulp Industry

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ing with the licensee. While most of the sublicenses were to be one-shot arrangements in which most of the money and most of the technology were to be exchanged very quickly and no long-term relationship would be required, the arrangement with our licensee was to be by its nature a long-term relationship which required fairly high business standards of performance and complete disclosure of problems, gripes, and complaints. This meant that the agreement between our two companies, while scrupulously drafted, had to provide for protections to both sides which would not appear in a standard license agreement, as well as leave open some matters for day-to-day agreement.

A very brief word as to some of the sublicensing that occurred after the execution of the basic ITT-license agreement:

All the licenses so far negotiated have wound up being lump sums, either one large lump sum or a lump sum spread out over a short period of time. I think our projections as to why the paper and pulp companies involved would not opt for a running royalty appear to be coming true in practice. As an aside, large lump sums of money received all at one time have always given me greater satisfaction than much smaller quarterly reports spread over a period of years.

The licensee has been using the basic format of the ITT-licensee arrangement in negotiating contracts with the sublicensees, but with important personalized additive paragraphs picking up the individualized problems of each sublicensee. In the ITT-licensee agreement, we did not specify a form contract required to be executed by each sublicensee as part of our flexibility scheme. This seems to be happening naturally.

ITT is fairly proud of the program and it has been mentioned in our Annual Report. Our contribution has been publicly recognized. More importantly, in view of our success in the paper and pulp industry, we are giving very serious consideration to expanding it to other industries. To me, that is the best indication the program is right.

The atmosphere is cleaner around some plants in this country and in Canada because we pushed a licensing program. We have achieved good income from an unexpected quarter.

Japanese Experience in Licensing

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West in terms of industrial and military strength in the first 70 years and in terms of industrial strength in the following 30 years.

Today, Japan has grown economically and is on the technological level comparable to that of Europe and the United States.

However, it is at the same time true that this growth of Japan has been attained at the cost of various side effects, such as pollution.

The reconsideration of the past orientation which placed too much emphasis on economic growth and the groping for a direction in which we should proceed from now on have become a central theme of Japan in the 1970's.

The future direction of Japan would have to be formulated on the basis of a thorough review in the 70's of the politcal, economic, social, national defense, and other aspects of Japan. I believe that in such formulation efforts, serious attention should be directed to:

1. The role of Japan in Asia on the basis of the U.S.-Japan cooperation.
2. Due regard to the special conditions of Japan and to people's welfare in economic growth and technological development.
3. Economic and technical assistance and cooperation to developing countries.
4. The balancing of still immature individualism based on democracy introduced in the postwar period and collective orientation based on Japan's historical and geographical backgrounds.

What is imperative in such efforts would be that evaluation and decisions need be made not from the viewpoint of Japan alone but from the international viewpoint in terms of cooperation and free competition.

Naturally, this would be reflected in licensing in various manners. I now shall try a brief overview of the major trends and characteristics of licensing in the coming