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The Technology Transfer Process: A Vehicle for Continuity and Change

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THE TECHNOLOGY TRANSFER PROCESS: A VEHICLE FOR CONTINUITY AND CHANGE

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I. INTRODUCTION

The technology transfer or licensing process[1] is a discipline

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1. The terms "technology transfer" and "licensing process" are used interchangeably herein. They refer to the range of transactions that govern the development, purchase, sale, and use of technology locally, nationally, and

which, if properly appreciated, can be utilized in a wide variety of circumstances. There is a strong parallel with another discipline, music—more particularly, with the playing of a large and complicated church organ.

A man named Johann Sebastian Bach could sit in a drafty church in Leipzig over 200 years ago and create a phenomenon that had an original, and to the ears of most listeners, very wonderful sound. By utilizing the universally recognized notations of music, the staff, clefs, notes of varying duration, sharps, flats, keys, and indications of loudness and spirit, Bach's creation could be captured so as to be recreated. An organist tomorrow, assuming he or she is skilled in the art, can produce anywhere in the world, with a satisfying degree of faithfulness, the composition originally invented by the composer.

The same may be said with regard to a technical invention. In order to be valid scientifically, it too must be reproducible. Certain novel aspects of the invention can be described with exactitude so as to be understood by someone skilled in the art. Assuming there is true novelty and a sufficiently lucid description, the invention can be awarded a limited monopoly in the form of a patent. Other aspects of the achievement can be retained as trade secrets or reduced to formuli, blueprints, operations and training manuals, technical specifications, plant schematics, and the many other recognized forms of notation for technology that have become widely accepted as falling within the broad definition of know-how.

If, in the marketing of the product or process resulting from the technology in question, it becomes identified with some distinctive word, symbol, or combination thereof, the law of trademarks becomes relevant. Although a relatively recent phenomenon, the right to use such trademarks may now also be transferred. With regard to some artistic or literary aspects of the creation, the system of copyrights becomes relevant. Here the parallel with music is congruent in fact as well as in theory.

The technology transfer process also includes various legal institutions that permit it to operate on a truly global scale. Protection of patents and trademarks may be obtained in virtually any country of the world through the mechanism of the International Convention for the Protection of Industrial Property, the so-

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internationally.

called "Paris Convention," which was originally adopted in 1883 and has since been amended several times. In addition, the Universal Copyright Convention, adopted through the leadership of the United Nations Educational, Scientific and Cultural Organization provides an effective method for obtaining copyright protection on a global scale.

If the baroque music of Bach is capable of reproduction in widely separated points of time and place, the same is also true of many other types of music, whether by Beethoven, Brahms, Bartok, or the Beatles. The same is true within the discipline of the licensing process; it is equally capable of providing a transmitting medium for chemical, mechanical, electronic, or biological achievements, as well as for consumer products or novelty items.

It also follows that the degree of skill and talent of a musician in recreating the compositions of Bach and others can directly influence whether the performance is marvelous, mediocre, or a disaster. The parallel holds here as well with regard to technology transfer. Let us therefore examine a bit more closely the various elements of this discipline, the stops, keys, and pedals of the technological organ, in order to gain an appreciation of the workings of the system as an integrated mechanism.

Reference has already been made to the following array of universally recognized intellectual property rights: patents, know-how, trademarks, and copyrights. Each is distinctly different from the others, but they operate in a complementary fashion. The only area in which there is a significant possibility of overlap relates to the decision, which must frequently be made by originators of technology, whether to obtain patent protection on patentable new inventions or to retain such achievements as unpatented trade secrets.

The various criteria involved in reaching such a decision highlight the point that strategy is an important factor in the successful deployment of the discipline. If the subject matter in question is easily duplicated by someone who can lawfully obtain possession of a sample, and assuming that the original inventor is financially strong, it is logical to obtain patents in all countries where the item could be manufactured in serious commercial quantities. Aside from the substantial expense involved in such a patent program, there are certain other negative aspects to this approach. The essence of the invention has to be disclosed as part of the patent application and whatever patent protection is ultimately granted only extends for a limited term of years.

The alternative approach is to retain the new development as a trade secret and disclose the substance thereof only to third parties who agree to be bound by covenants of confidentiality. The real risk here is that the persons may independently make the same discovery during the same time frame and be free to employ the fruits thereof as part of their own business activity. This type of trade-off must continually be considered in the administration of technology. Aside from the ability to appreciate the nature of the technology itself, a sophisticated understanding of the surrounding scientific, economic, and political environment is highly pertinent.

The strengths and weaknesses of the technology portfolio, as well as the stage of development of the relevant market, have a direct influence on the type of transaction that would be most appropriate under the circumstances. In order to choose the optimum business form, it is necessary to know the range of available possibilities and then adroitly utilize these tools, singly or in combination.

In viewing these technology transfer arrangements, it should be noted that many of the same considerations apply, whether a party is the buyer or seller of the technology. The respective parties start with different motivations, one to learn or to acquire something, while the other is seeking to profit in some way from intellectual property assets in its possession. There must nevertheless be significant agreement about the substance of the interchanges between them, which can occur on frequent occasions over a long period of time, as well as an appreciation that the relationship must be mutually profitable to persist. It should also be noted that the phenomenon of licensing is a dynamic process which permits alterations in form to enable the parties to adjust to changing circumstances. With this background, let us analyze the different types of relationships that are widely utilized in the field of licensing. The order of discussion reflects increasing degrees of commitment.

II. Licensing Relationships

A. *Sales of Goods*

The straightforward bargain and sale transaction often serves as the first step in developing a licensing relationship. The opportunity afforded the purchaser to examine, test, analyze, and break down the item in its possession can stimulate the interest to pro-

ceed further. Sales of complete products, as well as components and subassemblies, usually continue to be important to the relationship, even when the authority and ability to manufacture have been transferred to a licensee. This is because a licensee will frequently manufacture only the most popular models or formulations within the range of the licensed products, whose volume of local sales justifies the investment in production facilities by the licensee. Other, less popular versions, can continue to be purchased from the licensor if this is more cost effective. In addition, purchase from the licensor of key components of even the most popular models may be justified by tooling costs and the efficiency of long production runs at the plant of the licensor. This pattern, in which technology licensing either stimulates new sales of products and components from the licensor to the licensee, or in which sales of such items by the licensor would be lost but for the existence of a local licensee, has been repeatedly demonstrated in the course of congressional investigations into the question of whether international licensing results in the loss of United States jobs or the unnecessary diminution of United States industry. The answer has been uniformly negative.

B. *Sales Agencies*

The next stage of involvement occurs when a proprietor of technology retains a sales agent to solicit orders for the products in question and to refer them to the proprietor for approval. The sales agent is compensated with a commission, which is usually calculated as an agreed percentage of the sales price of the goods. There is usually no investment in facilities at the place of sale by the proprietor, and the only investment by the agent relates to the time committed to the project. Territorial exclusivity is a form of protection and incentive frequently provided to the agent, although this must be structured with care to avoid the proscriptions of the antitrust laws.

C. *Distributorship*

This deeper degree of involvement entails sales of the products concerned from the proprietor to the distributor, which resells the goods to its own customers at prices it freely determines. The distributor is required to invest its own capital to purchase the goods from the proprietor, promote sales, and store the goods in facilities under its control. Distributors also frequently invest in ser-

vice facilities because its customers' problems may be handled with a minimum of delay. Various types of territorial exclusivity are often present in these arrangements to induce the distributor to make the necessary commitment.

D. *Assembly Agreements*

Assembly agreements, which usually involve the construction of the proprietor's products from knocked-down kits or the repackaging of goods from bulk, require the added elements of production and packaging skills and efficiency, and direct or indirect investment in a local plant or contracting with a local manufacturing agent. The presence of quality control facilities is also usually relevant. If the assembler sells the goods for its own account, rather than merely producing them for the accounts of a merchant, it must also possess the marketing and sales skills of a sales agent or distributor.

E. *Straight Royalty Bearing Licenses*

The straight royalty bearing license is the classic licensing environment in which the proprietor allows the licensee to manufacture products locally and sell them in a mutually agreed territory. The licensor is usually remunerated by the payment of a lump sum plus running royalties that reflect sales or some other quantum of performance. If an element of exclusivity is granted to the licensee, there are often requirements that minimum royalties or other performance standards be attained or surpassed if the licensee is to continue to enjoy such exclusivity.

F. *Joint Ventures*

In the context of licensing, joint ventures may be defined as transactions in which the licensor owns a portion of the equity capital of the licensee. Such holdings can be minority owned, half owned, or majority owned, reflecting the relative value of the contributions of capital or technology by the respective parties and the degree of risk assumed. The rights of the parties are usually set forth in a separate shareholders' agreement, which frequently provides that certain described major decisions affecting the entity's business can only be taken by holders of a specific percentage of the issued shares. That percentage is greater than the holdings of the majority shareholder, providing each of the parties with a veto.

In addition to the shareholders' agreement, there is often a license agreement from the proprietor to the joint venture setting forth the terms and conditions under which the joint venture is permitted to use the intellectual property rights of the proprietor. Such license may or may not provide for royalty payments, depending on whether the parties consider the shareholding in the joint venture to be compensation, in whole or in part, to the proprietor for the permitted use of the technology.

One advantage of the joint venture is that it tends to promote intimate collaboration between the parties as a logical reflection of their commitments. These arrangements have had spectacular successes and embarrassing failures, depending on the skill and seriousness of the participants and the care of their advance planning. Joint ventures are recommended only for persons who know what they are doing and have the resources to devote thorough attention to the project. Sometimes this form of business is thrust upon technology proprietors by host governments that require local equity participation for defensive or acquisitive reasons.

G. *Subsidiaries*

The subsidiary is the legal form of technology transfer most frequently employed by the large multinational corporations. It is, however, not their exclusive province, and many smaller companies that are intent on penetrating a well-defined market also employ this form. Subsidiaries are often created by purchasing some existing business entity located in the relevant market. In other cases, new entities are formed and financed by the parent company. Either approach means that the proprietor has decided to make a serious commitment in resources, including manpower, because the situation merits a high profile approach. Thus, the parent should normally expect to see its policies, including those regarding technology transfer to the subsidiary, faithfully observed. The parent is entitled to receive all dividends from the profits of the enterprise, while also absorbing any loss that may occur. Political and commercial circumstances have become more uncertain in many foreign jurisdictions in recent years. The resulting risks have dimmed the enthusiasm of several technology proprietors to establish or maintain wholly owned subsidiaries in such countries. Accordingly, many of these entities have been converted to joint ventures or arm's length licenses in an effort to lower the profile and attendant risks. This illustrates the dynamic nature of the technology transfer process. Arrangements can

evolve into more deeply committed relationships, but the opposite is also true.

H. *Options*

In view of the ongoing and long term nature of the various forms of licensing transactions, it is frequently prudent to work with the technology involved on a trial basis before making a definite commitment. This is accomplished by the potential licensee taking an option. These transactions usually involve the payment of a lump sum by the licensee to the licensor in consideration for which the licensee will have the exclusive right, for a stated period of time, to consider the envisaged transaction in depth. The potential licensee is exposed to as much of the relevant technology as is reasonably necessary for it to reach a decision. This is usually done under confidentiality safeguards that are designed to prevent the licensee from taking undue advantage of this exposure in the event it does not proceed to take the license. In addition to studying the technical aspects of the proposed deal, the licensee usually makes a study of the relevant market.

It is advisable to append to the option agreement an outline of the principal points of the envisaged license agreement, in the event the licensee exercises the option. Indeed, if time permits, it is deemed preferable to attach the full text of the eventual license because this minimizes delay in the event that the licensee decides affirmatively. It is common for the option fee, or at least part of it, to be applied toward the down payment or initial fee under the license.

If the potential licensee declines to exercise the option, care should be taken by both parties to insure that their future permitted actions, particularly in the short run, will adhere strictly to the scenario agreed to at the time the parties enter into the option. The proprietor should have the right to receive relatively detailed reasons for a negative decision, because this will enable it to comprehend flaws or weaknesses in its negotiating position and, perhaps, correct them before contacting another potential licensee.

III. Other Legal Considerations

The legal climate surrounding the technology transfer process is not limited to the rights and forms of transaction described above. Many other considerations based on some aspect of law

are also relevant. Without going into great detail, these will be discussed below.

A. *Antitrust*

Attempted restrictions in intellectual property agreements can run afoul of United States antitrust laws and give rise to treble damages. There is an enormous amount of jurisprudence on this subject, which is continually expanding. Decided cases have defined several per se antitrust violations, and many other practices are subject to being struck down under the rule of reason. The United States antitrust doctrine has been successfully exported to many foreign national and regional jurisdictions. The most notable is the European Common Market, which has developed its own body of jurisprudence, including numerous cases directly involved with the licensing process under articles 85 and 86 of the Treaty of Rome.

B. *Patent Misuse*

Patent misuse is a doctrine developed in the United States that nullifies the enforceability of a patent in situations where the courts determine that the patentee is attempting to exercise rights exceeding the scope of the monopoly granted by the patent involved. Until the misuse is purged by some act of renunciation or remission by the patentee, the patent remains unenforceable.

C. *Restrictions on the Export of Technology*

A variety of regulations has been adopted by the United States Congress to control the export of defined types of technology considered to be strategically sensitive to the United States national interest. Many of these restrictions reflect past or present policies toward the communist countries or relate to nuclear energy. The procedures are principally administered by the Department of Commerce, but other agencies of the government are also involved.

D. *Taxation*

The degree of exclusivity of a technology transfer agreement can influence whether income therefrom will be taxed as ordinary income or as capital gain. Transactions between related companies are also scrutinized to determine whether remittances are to be deemed deductible expenses by the payor or hidden dividends

to the payee.

E. *Environmental Safety and Public Safeguards*

Laws and regulations administered by the Environmental Protection Agency, the Food and Drug Administration and the Occupational Safety and Health Administration, among others, can exercise a crucial influence on the form and date of introduction of new technology. State and federal enactments are relevant in this connection. Texts and standards of nongovernmental institutions such as Underwriters Laboratories and American Standards for Testing Materials are also relevant in this regard.

F. *Foreign Corrupt Practices Act*

The Foreign Corrupt Practices Act was a reaction to revelations that executives of certain prominent United States corporations were involved in the bribery of foreign governmental officials in order to influence the award of lucrative contracts or concessions. The law provides for severe penalties, but contains relatively vague outlines. The very existence of the Act had tended to inhibit the negotiating freedom of some United States companies, which have found themselves to be at a competitive disadvantage with powerful non-United States candidates.

G. *Conflict of Laws*

The enforcement and interpretation of international technology transfer agreements has sometimes been complicated by judicial interpretations of the governing laws, specific contractual provisions on conflict of laws problems notwithstanding. Foreign, as well as domestic, judicial attitudes to the licensing process should therefore be appreciated and understood.

H. *Code of Conduct*

There has been extensive and frequently heated debate in the United Nations, the United Nations Conference on Trade and Development, and special international conferences during the past several years about the performance of the so-called "transnational corporations" in the developing countries. The gist of the discussion is that the preponderance of the world's advanced, practical technology is concentrated in the hands of relatively few, large, privately owned corporations that operate on a global scale in a manner which usually discriminates against the inter-

ests of the developing countries. The representatives of the developing countries contend that the fruits of such technology should be made freely available to the Third World for the benefit of all mankind.

The technology proprietors and the spokesmen of the industrialized nations recognize that there have been certain abuses in the past, but also argue that many significant benefits have accrued to the Third World through investments and other initiatives of the transnational corporations and numerous smaller high technology companies. They support voluntary restraints patterned on the prohibitions of the antitrust laws.

The debate has already influenced the attitudes of Third World countries, many of which have adopted legislation calculated to regulate the inflow of technology. An appreciation of the twists and turns of these discussions is at least as important as familiarity with particular statutory provisions. The entire question can have enormous economic and political impact on all parties to the debate, particularly since these questions are now being linked to the considerations of the Organization of Petroleum Exporting Countries.

IV. Contemporary Challenges to the Technology Transfer Process

The importance of technology has never been greater than it is today. Persons who possess the skills and background to make the licensing process work effectively for them, their employer, or their government can have a significant impact on the environment in which they operate. This is partly because of the increasing relevance of technological innovations to our lives and also because the new technology itself is so much more powerful. Reverting to the music simile, Bach is important today because his compositions can be independently produced by skilled artists. John Lennon and the Beatles have affected overall society to an even greater degree because their actual performances could be simultaneously transmitted to millions of people by television, motion pictures of these events have preserved them for succeeding generations, the sound of their music has been recorded on phonograph records, audio-tapes, and cassettes, which have been sold by the hundreds of millions and can be faithfully reproduced by people who need not possess any of the skills of a musician.

When one begins to apply this example to the broader range of

scientific inquiry and achievements that touch virtually all aspects of our lives, it is possible to begin to appreciate the significance of the technology transfer process. Think for a moment in the narrowest business sense. Many companies have as their principal product or process something that did not exist five years ago. The efficient conduct of international business would be unthinkable without telex, rapid long distance and overseas telephone communications, and the jet airplane. None of these systems could operate without computers, solid state electronics, and microprocessors. The gathering, synthesis, and organization of information into meaningful guidelines would be physically impossible without the existence of data processing equipment that hardly existed ten years ago.

Now look at things with a wider perspective. Consider the following buzz-words, many of them new to our language: 64,000 bit chip, DNA, RNA, cloning, aging inhibitors, robotics, solar energy, heat pumps, home computers, prosthetics and organ transplants, Voyager, retorted pouch foods, single cell proteins, synfuels, and media. Relate them, successively, to the rate of technological innovation and change over the past 300 years, during the Twentieth Century, since World War II, and within the past 10 years. Then consider what the next twenty-five years may bring, as the pace of scientific revolution continues to accelerate. The images that these words evoke can boggle the mind, particularly one which is attuned to the music of technology transfer. One important reason for this is that many of the most important technological breakthroughs have been conceived by individuals or small companies, which usually did not possess the human and economic resources to refine these ideas into cost effective items of commerce. It seems that the inventive flash of genius can occur anywhere and is not confined to the well-equipped corporate research laboratory generously staffed by Ph.Ds.[2]

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2. Consider, for example, the following landmark inventions or discoveries originated by individuals or relatively small companies:

Invention or Discovery	*Inventor*
Xerography	Chester Carlson
Insulin	Frederick Banting
Vacuum Tube	Lee DeForest
Rockets	Robert Goddard
Streptomycin	Selman Waksman
Penicillin	Alexander Fleming
Titanium	W.J. Kroll
Shell moulding	Johannes Croning

Individuals obsessed with some radical idea, university researchers insulated from any of the short term pressures of the commercial world, and small companies motivated by a keen entrepreneurial drive continue to be fertile sources of important inventions and innovations. By the same token, the outpouring of technological achievements from major research and development centers, working either on their own ideas or those which were brought in from outsiders, continues in an ever increasing flow. The technology transfer process provides an essential linkage between these areas of creativity and enables the newest products and processes of science to be distributed around the world.

V. Conclusion

As the scope and impact of technology continues to increase geometrically, so too does the significance of the discipline that helps transform ideas into achievement. Indeed, the circle may soon be completed in another way, as the achievements of tech-

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Cyclotron	Ernest O. Lawrence
Cotton Picker	John & Mack Rust
Shrink Proof Knitted Wear	Richard Walton
Dacron Polyester Fiber "Terylene"	J.R. Whinfield and J.T. Dickson
Catalytic Cracking of Petroleum	Eugene Houdry
Zipper	Whitcomb Judson and Gideon Sundback
Automatic Transmissions	H.F. Hobbs
Gyrocompass	A. Kaempfe, E.A. Sperry and S.G. Brown
Jet Engine	Frank Whittle and Hans Von Ohain
Self-winding Wristwatch	John Harwood
Continuous Hot-Strip Rolling of Steel	John B. Tytus
Helicopter	Juan De La Cierva, Heinrich Focke and Igor Sikorsky
Mercury Dry Cell	Samual Ruben
Power Steering	Francis Davis
Kodachrome	L. Mannes and L. Godowsky, Jr.
Air Conditioning	Willis Carrier
Polaroid Camera	Edwin Land
Heterodyne Radio	Reginald Fessenden
Ball-Point Pen	Ladislao and George Biro
Tungsten Carbide	Karl Schroeter
Bakelite	Leo Baekeland
Oxygen Steelmaking Process	C.V. Schwarz and J. Miles
Frequency Modulation Radio	Edwin Armstrong

These achievements realized their commercial success because their related intellectual property rights were acquired by entities possessing sufficient testing, production, and marketing resources to develop them.

nology may make possible increased leisure, a time that may be devoted to the creativity and pleasures of music and other art forms.