Unit 17

TITLE: MARKETING TECHNOLOGY

PURPOSE: Innovation is always intended to create new markets or to enhance the innovator's (i.e., the firm's) position in an existing market. Thus, successful technology transfer efforts must be market-oriented. This unit increases laboratory personnel's awareness of the importance of basic market concepts from the perspective of the laboratory and the firm. An overview of the activities associated with marketing technology is also presented.

OBJECTIVES: Upon completion of this unit, participants will:

- Understand the definition of a market
- Understand the contribution technology makes to a firm's market position
- Have been introduced to the "marketing concept"
- Be aware of the three major parts of the technology marketing process
- Have an understanding of the types of markets for technology
- Be aware of the components of market research and their relevance to transferring technology
- Have identified the steps in promoting a technology
- Have been exposed to the general licensing process and the roles of laboratory personnel in each part of the process.

MATERIALS:

Transparency 17-1: Marketing Technology

Transparency 17-2: A Market Is. . .

Transparency 17-3: Market Position

Transparency 17-4: Marketing Definitions

Transparency 17-5: Marketing Concept

Transparency 17-6: Technology Marketing Process

Transparency 17-7: General Market Characteristics

Transparency 17-8: The Market For Technology

Transparency 17-9: Technological Innovation And Technology Transfer

Transparency 17-10: Locus Of Innovation

Transparency 17-11: The Large Enterprise And Its Growth

Transparency 17-12: Industry Analysis

Transparency 17-13: Industry Life Cycle

Transparency 17-14: Company Profiles

Transparency 17-15: No One Will Respond to a Technology If. . .

Transparency 17-16: Data And Information Requirements to Support Technology Transfer

Transparency 17-17: Example A

Transparency 17-18: Data And Information Requirements

Transparency 17-19: Example B

Transparency 17-20: Data And Information Requirements

Transparency 17-21: Licensing/Joint Venture Procedure

REQUIRED READING:

Thomas M. Jacobius and Robert S. Levi, "The Role of Marketing in Technology Transfer," pages 12-1 through 12-11 in James A. Jolly, ed., Technology Transfer Society International Symposium 1980.

OPTIONAL READING:

1. C. G. Ryan, The Marketing of Technology, Chapter 4 (Technology Marketing), Peter Peregrinus Ltd., London, 1984 (on behalf of the Institution of Electrical Engineers).

2. John Wilmshurst, The Fundamentals and Practice of Marketing, Heinemann, London, 1984.

SUPPLEMENTAL READING:

Floyd Grolle, Some Secondary Information Sources, Society of University Patent Administrators, 1986.

NOTES TO INSTRUCTOR:

1. This unit is primarily concerned with marketing laboratory-originated technology to the private sector. Commercialization is the objective of the transfer. This unit does not discuss all of the transfer mechanisms, but focuses on licensing as a primary mechanism to promote transfer and commercialization.

2. Although the license is the final step in the process of marketing technology, this unit focuses on the marketing aspects that are essential before a license can be negotiated. As such, this unit lays the foundation for the discussion on value and pricing technology contained in Unit 18

(Introduction to Technology Value and Pricing Issues).

3. The two units (17 and 18) may be combined and presented as one seminar.

4. The market discussion is very basic. A technology manager may choose to enlist the assistance of a marketing professor or consultant to make presentations on the fundamental market concepts or to provide additional examples to a laboratory group. This person should have some experience or familiarity with marketing technology.

5. The required reading by Jacobius and Levi addresses marketing from the perspective of practitioners in Federal technology transfer. The optional reading by Ryan is in a new and fundamental text on technology management and marketing. The optional reading by Wilmshurst is a good introductory marketing text. The supplemental reading by Grolle is an annotated bibliography of marketing data bases.

ESTIMATED TIME:

40 minutes for presentation
80 minutes with discussion

Unit 17

MARKETING TECHNOLOGY

Transparency 17-1: Marketing Technology

NOTE: PRESENT PURPOSE AND OBJECTIVES OF THIS UNIT.

CONCEPTS

We are going to discuss issues that are raised in marketing technology; however, it will be very useful to discuss the concept of markets before we begin. The terms "markets" and "marketing" are used in several ways by different people.

Markets

The term "markets" as commonly used is:

Transparency 17-2: A Market Is. . .

NOTE: READ DEFINITIONS.

You will notice that there are sellers and buyers in both definitions. The first definition conjures up the image of the bazaar or a well-defined location where people go to sell goods and to haggle over prices. The second definition is more familiar and also introduces the idea of competition in attracting customers. However, we should be very careful here because in marketing technology both definitions apply, and it is very useful to understand in what ways each one applies.

When an organization such as a business firm, nonprofit, or governmental unit either has a technology or is seeking to acquire a technology, the first definition is directly applicable. In technology transfer situations, a transaction occurs: one party sells and the other party (or parties) buy; but the terms of the transaction (e.g., patents, royalties, cooperative R&D, technical assistance) are negotiated. Bargains are struck. Because of the high degree of

bargaining in transferring technology, particularly when licensing is the transfer mechanism, there are no hard and fast rules.

The second definition is also applicable to technology transfer efforts. It applies primarily to the firm's situation. Firms usually compete with similar companies to provide similar goods and services to a similar group of people. Monopolies (e.g., utility companies), of course, are different; but even these firms have customers that must be reasonably satisfied. Even monopolies are concerned, and must be concerned, with the needs and wants of their customers. It is the job of all firms to satisfy the needs and wants of their customers. Operating on this principle is called having a "market orientation."

In transfer situations involving licenses, the Federal laboratory functions as the seller, and the firm that will commercialize the technology functions as the buyer. Thus, in a sense, the Federal laboratory assumes the role and functions of a firm, and the firm becomes the lab's customer. Just as firms must constantly know and appreciate the needs and wants of their customers (e.g., other businesses, government, consumers), Federal laboratories must also know and appreciate the needs and wants of their customers (i.e., firms that will license the laboratories' technology).

Thus, potential licensees are the laboratory's "market." The laboratory must satisfy the needs or desires of its customer in order to be successful. Since the firm licensing the laboratory technology will in turn have to satisfy its customers in order to be successful, the laboratory can also expect that firms will only be interested in a technology that can help them to satisfy those customers (whether they are existing or potential customers).

Transparency 17-3: Market Position

Because the vast majority of firms must compete with other firms, new technology can greatly enhance the firm's market position (i.e., its relationship to its competitors in serving a particular set of buyers or customers) if the technology:

1. Satisfies customer needs or desires: The firm must be able to embody the technology in a product that people will choose over the competition's products.

2. Enhances competitive position: The firm can use a new process or produce the final product at a total cost that allows the final price of the product to be competitive with other products.

3. Achieves revenue growth and enhances profitability: The opportunity for growth is greater than the investment required to produce and sell the new product--that is, it enhances profitability.

DO THE PARTICIPANTS UNDERSTAND AND AGREE WITH THIS CONCEPT OF THE LABORATORY AS A SELLER WITH A CUSTOMER?

Marketing

The term "marketing" refers to:

Transparency 17-4: Marketing Definitions

NOTE: READ DEFINITIONS.

The first definition includes jobs such as marketing directors and salesmen or a department or group that performs marketing activities within a firm. Marketing activities include sales, advertising, and market research. Marketing as a philosophy that orients all the firm's activities on its marketing concept is increasingly important to American firms.

Most companies have a market concept that constantly orients all of the firm's activities toward providing solutions to their customers problems, thus focusing attention on satisfying customer needs and desires in return for payment.

Transparency 17-5: Marketing Concept

The marketing concept places the customer at the center of all the company's activities. Peter Drucker, a noted management expert, states the principle very well: "What the customer thinks he is buying, what

he considers value, is decisive--it determines what a business is, what it produces, and whether it will prosper."

A firm operates in an environment that includes legal, economic, and social forces that influence it and its customers. The firm's products--the way they are sold, how they are sold, where they are sold, and for what price--are in the final analysis determined by the customer. The firm must operate in its markets, focusing on satisfying its customers within the context of the influences of the larger environment.

A firm's marketing concept and its marketing activities are very important in technology transfer efforts. If we think of a firm's marketing activities as the entire process of delivering solutions to customers, we see immediately that firms must constantly respond to changes in the external environment (e.g., shifts in the economy, new regulations, shifts in population) as well as to changes in customer needs and the competition.

An important factor for most industrial firms and many consumer-oriented firms is the development of new technology. The technology may be a process technology that alters the way the firm's products are made. It may be technology that will be embodied in new products or improve existing products. In any case, new technology has the capacity to alter any or all of the major elements in the second circle--<u>if</u> it produces something that customers will buy. Sometimes technology-based products or services will be powerful enough to influence any or all of the components in the outer circle. Automobiles, computers, and biotechnology products are examples.

MARKETS FOR FEDERAL LABORATORY TECHNOLOGY

Federal laboratories produce technology. The primary purpose of technology transfer is to complete the transaction between the laboratory and a firm (or firms) that will commercialize the technology by incorporating it in a product, process, or service that will be purchased by its customers.

As we have said, in technology transfer, the laboratory is the seller, and the firm(s) is the buyer of the laboratory technology. Thus, the laboratory will need to engage in many of the same types of

activities with respect to its customers that firms perform in order to be successful.

Transparency 17-6: Technology Marketing Process

Viewing the firm as a customer means that laboratories need to identify markets (i.e., potential customers), promote the technology (e.g., some form of advertising), and sell it (i.e., usually by licensing). This process is what we mean by marketing the technology.

Identifying Markets

The first step is to identify the market for a particular technology. Technology has a marketplace in which it is bought and sold like any other commodity.

Transparency 17-7: General Market Characteristics

To understand that market, first we need to recognize that a market is generally characterized by a demand that can be met by an available supply; that is, there is someone who wants the technology the laboratory has or can develop.

A market can be created by making latent (unexpressed) demand into effective (expressed) demand and then coupling that latent demand with available supply, such as the supply of technology. The laboratory supplies technology to a firm that exhibits a demand (i.e., a need or desire for the technology).

The market for technology is really defined by the demand side of the equation. Demand for technology is what creates the market. There is a supply of technology available. It is the matching of those supply elements with demand that makes the market.

The market for technology is derived from what a technology is expected to be able to do for the customer that uses it. Now what is it that technology can do?

Transparency 17-8: The Market for Technology

NOTE: READ ITEMS.

These are obvious things that technology can do for the firm. No one buys technology just because it's fun exploiting it, but fun is part of technology transfer. It's one of the elements that one cannot quantify in any way, or value; but it is an element.

Generating profits and creating revenues are measures of the firm's success in satisfying its customers. The firm will be interested in these items in its role as a customer of laboratory technology. At the same time, it will be interested in what the technology will do for its own customers. The laboratory should have some idea of what these items are worth to a firm.

Transparency 17-9: Technological Innovation and Technology Transfer

---

Markets emerge as a function of what a technology can do and what a technology can accomplish when it is exploited. If you look on the left-hand side of this transparency, you will see all the things that were on the previous transparency, and you will get some idea of where the markets are.

A technology that could only create jobs would be of primary interest to the government. Revenues and profits are almost exclusively of interest to industry. Governments are interested in stimulating economic growth, and so forth.

Now where do you find innovation? Where do you find new technology being exploited?

Transparency 17-10: Locus of Innovation

You find it across the full spectrum of economic activity in our society. Small firms, medium-sized firms, large firms, government enterprises, government agencies (Federal and other), and public

enterprises such as airports, seaports, and not-for-profit hospitals are all innovative.

When is a firm interested in a technology that can serve as the basis of an innovation? The growth objectives of a potential taker of laboratory technology are the most powerful force in interesting a firm in technology.

Transparency 17-11: The Large Enterprise and Its Growth

Here is a mathematical representation of a fairly typical large business. The annual sales are about $2 billion, and the firm is experiencing declining sales of eight percent a year because of product obsolescence. Prices are reduced against competitive pressures, about four percent a year on average. But there is a growth objective in revenue terms of 10 percent a year. They need to generate $440 million in new revenue every year. So how are they going to meet this objective?

Present products and services probably will not be the source of that much new revenue. The firm is being beaten down in price. It is dropping out of the market. So it is not going to get much from its present products and services.

But there are opportunities in new products in present lines of business, in wholly new lines of business, and through the acquisition of other firms. There are many firms faced with this situation. The first two sources are the most likely opportunities for Federal laboratory technology.

The same principle applies to smaller companies, but they are quicker to respond by developing new products to serve a market niche. Big companies have to have big markets and move slower than small companies. It is this characteristic that makes small, highly specialized products with small, high-profit markets good candidates for transfer to small and medium-sized firms.

The markets for laboratory technology will more than likely be firms faced with the need for new technology to achieve growth

objectives. How is one to know why a firm is seeking new technology and thus how the laboratory can best promote and sell it?

The key here is to understand the applications of the technology. First, identify what industries (large groups of firms) would possibly be interested in that application. The next step is to understand what's going on in that industry: Who are the major companies? What's their market position? Who are their customers? How will the technology improve their ability to serve their customers better? Will new technology improve the company's market share (i.e., the percentage of the market for a particular group of customers buying similar products or services)? What is the state of the industry's technology base? What direction is the technology headed? How does this technology fit in the overall picture?

Market Research

At this point, market research would be conducted by the laboratory. An industry analysis is the first step. In this phase, the following elements should be considered:

Transparency 17-12: Industry Analysis

NOTE: READ ITEMS ON TRANSPARENCY.

The first two items concern size and growth in terms of revenues and annual growth in sales. Key growth factors are trends and conditions that affect the companies operating in the industry, particularly the industry's market size.

NOTE: INFORMATION ON MARKET SIZE AND GROWTH RATES IS USUALLY AVAILABLE FROM GOVERNMENT PUBLICATIONS, TRADE ASSOCIATIONS, AND TRADE JOURNALS. REFER TO THE SUPPLEMENTAL MATERIALS FOR THIS UNIT.

All industries have a life cycle that reflects the growth and general characteristics of the industry. The four stages are:

- Embryonic
- Growth
- Mature

. Aging

Some of the characteristics of the industry at each stage can be seen in this transparency.

Transparency 17-13: Industry Life Cycle

The stage of the industry's life cycle is important in technology transfer. Notice the various characteristics associated with technology for each of the stages in the cycle. A thorough industry analysis can provide important clues in identifying opportunities for transfer to companies within an industry.

ASK THE PARTICIPANTS TO IDENTIFY LIFE CYCLE STAGES OF FAMILIAR INDUSTRIES. FOR EXAMPLE, ELECTRONIC MEASURING INSTRUMENTATION IS EMBRYONIC. MICROCOMPUTERS IS IN THE GROWTH STAGE. WHICH ONES ARE LOOKING FOR NEW TECHNOLOGY?

The next step in market research for laboratory technology is to identify companies that are potential transfer candidates. In market terms, these companies are potential customers for the laboratory's technology. A great deal of information about companies will emerge from the industry analysis. It may already be very evident which companies (if not all) would be interested in a laboratory technology. These companies should be profiled according to the following criteria:

Transparency 17-14: Company Profiles

NOTE: READ MATRIX CATEGORIES.

In looking for potential technology takers, it is important to remember that the number of potential candidates is not likely to be extremely large, so the job of collecting data is manageable. In fact, in dealing with technology markets, insight is often more important than statistics that are used in analyzing consumer markets.

Instead of doing broad research to achieve statistical reliability, it is better to interview a very small number of people in

depth about opportunities. Initially, much information can be gathered by simply discussing possibilities with a small group of individuals who are knowledgeable about the industry and its customers. The interviews do not necessarily have to be formal. The insights that are needed can be obtained by using a method called revealed preference analysis.

All this means is that people reveal their preferences for a new product or service that is capable of being produced with the technology in question. Contacts can be made with the companies, their suppliers, and industry experts. If possible, it will be very useful to get the ultimate customers to reveal their preferences in functional terms. The question to be asked is: if you could design the product yourself, what would it do? Then it is possible to see if the technology will permit a product to be put into the marketplace that meets the requirements of the firm's customers. Professional market researchers may be needed at this point. Now the laboratory has something of real interest to firms--a technology with market data to back it up.

At this stage, a firm may also be interested in establishing a cooperative R&D agreement with the laboratory to continue work on the technology. The firm will be very interested in designing a technology that meets its market's functional requirements and its own internal criteria for new products (e.g., manufacturing, marketing, and financial).

PROMOTING THE TECHNOLOGY

Transparency 17-15: No One Will Respond to a Technology If--

Marketing technology involves promotion. Promotion is informing prospective buyers of the existence of the technology, its functional capabilities, and what products or services the technology can permit a licensee to produce. There must be a campaign to make the existence of the technology and the benefits that flow from the technology's exploitation known to the right people. This is not just a matter of simply publishing a list of available technologies. Promotional

materials must be market relevant. No one will respond to a technology if:

NOTE: READ LISTED ITEMS.

It is surprising, but clearly true, that firms rarely look at a technology in the raw (i.e., as it is produced in the lab) and see its relevance to their markets and objectives. The laboratory will generally have to do that for firms in order to get their interest.

Company managers will need to have the information that relates the technology to their markets. The information gained in the market analysis will be useful in initiating such discussions.

Transparency 17-16: Data and Information Requirements to Support Technology Transfer

---

At this stage of discussion, most of the information will be scientific and technical information that proves the case for the technology. Scientific and technical information is very important. If the technology cannot be replicated, or cannot be used in the setting of the acquirer, it probably will not be developed for commercial use. If the technology is not fully developed or the firm cannot successfully integrate the new technology into its existing capabilities, there is an opportunity to structure a cooperative R&D or technical assistance agreement as part of the license and transfer.

Appropriate data and information are a prerequisite to marketing technology. These are certain types of data that may be required to promote the technology:

NOTE: READ TYPES OF DATA BEGINNING WITH "SCIENTIFIC DATA PLUS PERFORMANCE DATA."

Now let's look at a couple of actual examples of data requirements.

Transparency 17-17: Example A

In our first example, the licensor (i.e., the supplier of the technology) was a nationalized European producer of steel--a large firm. The potential licensee was a producer of steel in the United States. The patents and knowhow being licensed related to a process for treating steel that improved its quality and uniformity in sheet, coil, and shaped form. It was a basic, fundamental technology for both firms--the licensor and the licensee.

Now, in order to market this technology, the European firm (the licensor) sought the following data and information:

Transparency 17-18: Data and Information Requirements

NOTE: ALLOW PARTICIPANTS TIME TO READ DATA ELEMENTS.

The list is not exhaustive, but it's got all the major elements. They required profiles of every major U.S. steel producer and major process equipment suppliers, so they knew the universe of potential licensees.

Why would they want profiles of suppliers? Because it is possible that they would be better off licensing to a supplier to steel producers rather than to the steel producers themselves. They wanted to know the economic value of the technology to individual steelmakers and to the U.S. industry as a whole. And they wanted to know if there were any competitive processes as advanced and as up-to-date as theirs.

The U.S. firm (the potential licensee) needed information on patents, and they wanted backup material related to the patents. They also wanted performance statistics from the licensor. They wanted a comparison of the capital and operating costs with and without using this technology. They wanted to know, of course, the terms and conditions that the licensor was seeking for the technology. They also wanted value-added projections to determine if they could add more value in their plants with this process than they had been able to do previously. And they wanted to know whether there were any competitive processes that were around that were not known to them, but in fact

would be competitive with this process. The U.S. firm ended up licensing the technology.

Now let's move to Example B.

Transparency 17-19: Example B

Example B involved the sale of all rights worldwide of patents and knowhow associated with a new lightweight composite fibrous material with exceptional tensile strength. The seller was an independent inventor. The potential buyer was a large British industrial producer of tires and other rubber products. The cord used in the construction of the tires needed to be very light and very strong.

The inventor had come up with a new material that was much stronger for its weight than existing materials. It was more than twice as strong as Du Pont's new aramid fibers. The Air Force learned about it and bought material from the inventor that was made on a hand-driven spindle, like an old spinning wheel. They bought enough for a dozen sets of cable to shore up air-transportable loran-C systems.

This inventor took the technology to a consultant who happened to be working for the Dunlop company. The coincidence is important because serendipity is so important in technology transfer. It really isn't all scientific. Things just happen.

Dunlop was in trouble competitively because Du Pont had introduced the aramid fibers, and the U.S. tire producers were moving rapidly. Du Pont and Dunlop didn't get along too well. So Dunlop was standing at the end of the line for these quite scarce aramid fibers, and here was cabling material that was much stronger than even Du Pont's, and perfect for Dunlop's situation.

NOTE: THIS IS THE TYPE OF INFORMATION THAT WOULD BE REVEALED BY A GOOD INDUSTRY ANALYSIS, WHICH WOULD REVEAL THAT DUNLOP (NEEDING A NEW TECHNOLOGY) WOULD MAKE A BETTER TRANSFER CANDIDATE THAN DU PONT (WHICH HAD JUST DEVELOPED A NEW MATERIAL).

Now look what the seller's (i.e., the inventor's) questions were:

Transparency 17-20: Data and Information Requirements

NOTE: READ SELLER'S REQUIREMENTS.

The seller is asking explicit questions. These are different questions than asked by the licensor in Example A. The licensors in the two cases were seeking different information based on different marketing concepts. They had different approaches to the market for their technologies.

In this example, the seller was particularly interested in making sure that he got some money out of it before he died. He was in his seventies by that time. How can I be assured that the technology will be exploited to the full? The big British steelmaker didn't ask that of the big U.S. steelmaker. He assumed it. They are big because they are successful at exploiting technology. The inventor wanted to make sure that they weren't going to put it on the shelf, that they were a capable organization.

DO THE PARTICIPANTS SEE THE DIFFERENCE IN THE MOTIVATIONS?

The buyer, on the other hand, required the same types of information in both examples. Some of the seller's questions in this example may be relevant to bench scientists and engineers as they approach the ORTA or technology manager, and some are relevant to the laboratory.

In summary, it is clear that marketing technology is not simple. The better mousetrap theory says that if you build a better mousetrap, the world will beat a path to your door. This is, in most cases, a myth. Each marketing effort must be tailored, keeping in mind the nature of the technology, the nature of what it can do, and the nature of the parties that are potentially the acquirers of it from the laboratory. The potential acquirers of the technology need to be identified, and their customers need to be identified. The market analysis that underlies the marketing effort needs to be relevant and persuasive. The technology's value has to be promoted to the firm.

NOTE: THE INSTRUCTOR MAY WISH TO REFER TO THE SUPPLEMENTAL READING BY GROLLE FOR EXAMPLES OF MARKETING DATA BASES.

SELLING THE TECHNOLOGY

Transparency 17-21: Licensing/Joint Venture Procedure: A General Case

---

The third stage of the marketing process is to sell the technology. For Federal laboratories, a licensing arrangement constitutes a "sale." We are not going to discuss the legal specifics of structuring licensing agreements here. But, we do want to look at the general procedure.

You will notice that there are various stages and actors in this process. The first three blocks involve laboratory personnel. The inventor(s) will need to explain the technology to the transfer agent and laboratory management and help define the package. The package is a description of what is being offered--patents, knowhow, technical assistance, cooperative R&D, or a combination.

Blocks 4 through 8 include the types of market research and analysis that we have been discussing. Promoting the technology begins in Block 5 with drafting a proposal, but assumes increasing importance at blocks 9 and 10. The activities associated with the market research and promotion stages can be handled in-house, or consultants or brokers can be brought in to assist the laboratory.

Once it is determined that there is a positive response from the prospective licensee, attorneys or government organizations such as CUFT can be brought in to draft the agreements. Laboratory ORTAs, directors, brokers, consultants, or attorneys can participate in the detailed negotiations with the firm or firms that are licensing the laboratory's technology.

NOTE: REMOVE TRANSPARENCY.

NOTE: THE REQUIRED READING BY JACOBIUS AND LEVI AND THE OPTIONAL READINGS BY RYAN AND BY WILMSHURST (IF ASSIGNED) SHOULD BE USED AS A BASIS OF DISCUSSION.
