Unit 11

TITLE: ACTORS IN THE TRANSFER PROCESS

PURPOSE: This unit provides an overview of the various actors (or participants) in the technology transfer process.

OBJECTIVES: Upon completion of this unit, participants will:

- Be familiar with the major actors in the private and public sectors in accomplishing technology transfer
- Be familiar with the broad roles of each of the actors and their relationships to one another
- Have identified a primary technology transfer management challenge (i.e., establishing appropriate inter-organizational and intra-organizational communication channels)
- Reviewed a generalized example of the way in which innovation functions may be segmented in the private sector
- Observed appropriate entry points for laboratories
- Identified third-party participants that may be included in or influence the technology transfer process.

MATERIALS:

Transparency 11-1:	Actors in the Transfer Process
Transparency 11-2:	Government Transferor Participants
Transparency 11-3:	Private Sector Transferee Participants
Transparency 11-4:	Third-Party Participants
Transparency 11-5:	Multiple Firms in a Single Innovation Process

REQUIRED READING: Chapter 4 (Mechanisms) in Frank Bradbury et al., eds. Transfer Processes in Technical Change, Sijthoff and Noordhoff, The Netherlands, 1978.

OPTIONAL READING:

1. Modesto A. Madique, "Entrepreneurs, Champions, and Technological Innovation," pages 562-581 in Michael L. Tushman and William L. Moore, eds., Readings in

the Management of Innovation, Pitman Publishing Inc., Marshfield, Massachusetts, 1982.

2. Sherwood L. Fawcett, prepared statement for the U.S. House of Representatives, Committee on Science and Technology, Subcommittee on Science, Research, and Technology, Hearings on Technology Transfer, Ninety-Ninth Congress, May 21, 1985, pages 16-19.

NOTES TO INSTRUCTOR:

1. The required reading by Bradbury, though titled "Mechanisms," deals primarily with actors as mechanisms. The optional reading by Madique describes how champions operate in the private sector. The optional reading by Fawcett (Chairman of the Board of Battelle Memorial Institute) covers some of Battelle's experience in technology transfer and stresses the importance of using outside expertise.

2. No one person in the private sector or the public sector within an organization has all of the skills and experience needed to accomplish technology transfer. The process involves many people with specialized functions each contributing to the successful accomplishment. It is important to realize that expertise and resources exist both outside and within the laboratory that can be used to assist laboratories in fulfilling their roles.

3. It cannot be overstressed that communication is essential, particularly when various organizations are involved.

ESTIMATED TIME:

20 minutes for presentation
40 minutes with discussion

Unit 11

ACTORS IN THE TRANSFER PROCESS

Transparency 11-1: Actors in the Transfer Process

NOTE: PRESENT PURPOSE AND OBJECTIVES OF THIS UNIT.

GOVERNMENT TRANSFEROR PARTICIPANTS

Let us begin by talking about the participants on the government side, the public sector side in the transfer of technology.

Transparency 11-2: Government Transferor Participants

NOTE: THE TERMS TRANSFEROR AND TRANSFEREE ARE USED IN THIS UNIT AS A CONVENTIONAL WAY OF IDENTIFYING TRANSFER PARTICIPANTS. THE RESERVATIONS ABOUT THESE TERMS EXPRESSED IN UNIT 4 (TECHNOLOGY TRANSFER) SHOULD BE KEPT IN MIND.

This list is general and by no means complete. Many people will be involved at some time (e.g., personnel), but these are the main participants. Everyone in the organization is fundamentally involved in one way or another in technology transfer, or at least is potentially involved.

The champion is included as an actor because the technology that is available for transfer is usually nurtured and "moved" through the organization by an individual. Working between sectors, a champion is usually required on the supply side (i.e., government), as well as on the demand side (i.e., a firm).

NOTE: SEE UNIT 5 (KEY IMPLEMENTATION CONCEPTS) ON THE ROLE OF THE CHAMPION.

The technology manager or the ORTA is the general champion for all technology in the lab with transfer potential, but as a practical matter they can't be champions of every technology. There are too many. One just can't develop the enthusiasm or the knowledge, and it is one

of the management tasks for the technology manager and the ORTA to find potential champions for technologies that show transfer promise and to cultivate and encourage them to exercise championship.

The direct participants on the government's side clearly include the bench scientists and the engineers in each laboratory. They function as inventors, developers of technology, participants in cooperative research ventures, and providers of technical assistance.

One very important role for bench scientists and engineers should be underscored: their role as the originator of transfer opportunities. This role is not restricted to possible technologies they may be working on (although this is, of course, very important); it also includes the indirect, but crucial, role of spokesman for the laboratory's capabilities and interest in technology transfer.

Professional meetings and personal contacts with industrial counterparts are primary sources of transfer opportunities. The private sector needs to be informed of the laboratory's interest in technology transfer and to be assured of a contact person within the laboratory to follow up on identified transfer opportunities, whether that opportunity involves the bench scientist or engineer himself or some other individual or group in the laboratory.

Program managers provide a key function. Technology transfer presents the opportunity to supplement funds for mission work by enlisting industrial support. The primary mechanism is a cooperative research agreement with one or more industrial firms. This is a very attractive option, particularly if the mission work is itself intended ultimately for commercialization.

Because of the necessary involvement of bench scientists and engineers in most transfer efforts, program managers need to provide understanding and approval with respect to the allocation of research time.

The ORTA serves in a key position in the coordination of transfer efforts. The ORTA's responsibilities as defined by the Technology Transfer Act of 1986 (Sec 10[c]) include:

- Preparing of application assessments for technologies with potential commercial applications

- Disseminating information on Federally owned or originated technology
- Cooperating with and assisting NTIS, FLC, and other Federal technology transfer organizations
- Participating in, stimulating, and facilitating technology transfer efforts in cooperation with regional, state, or local jurisdictions.

On a more informal basis, the ORTA may need to generate the enthusiasm and grassroots support within the laboratory that is critical to effective technology transfer efforts.

Laboratory directors have management decision responsibilities in integrating technology transfer activities into the lab's operations. Without the support of the director, transfer efforts can be difficult if not impossible. The director can best facilitate transfer efforts by clearly defining the lab's policy concerning technology transfer and disseminating the policy to all personnel.

The lab director is the lab's technology manager, with ultimate authority over technological activities concerned with primary mission functions and the secondary mission of technology transfer. The director will need to make final decisions on such things as laboratory strategy with respect to the transfer of technologies and the pursuit, funding, and time and personnel allocations with respect to cooperative R&D agreements.

The director also needs to support ORTA functions and responsibilities with respect to external problems such as those that will be encountered in negotiations with private firms. Regarding laboratory relations with private sector firms, the company's management will want to be assured of the lab director's commitment to the transfer effort.

Attorneys function in several areas: performing patent searches, obtaining patents, and drafting legal agreements such as licenses or cooperative R&D agreements. In some cases, attorneys may be used to negotiate the terms of a license or another legal agreement, but this is not always required. It is perfectly possible to rely on the advice of an attorney, with negotiations conducted by laboratory personnel (e.g., ORTA staff, lab director, champion, or broker).

We should also note that some of the people listed here as government participants may in fact be in private employ. They may not be government employees, but still be government participants. This is especially the case for GOCOs. It is important to remember that government laboratories have the option to bring in outside experts on occasion to assist in moving a technology to the market, even on a direct basis.

Agency management is involved indirectly from the government's side. Some important areas of responsibility are still within agency discretion under the legislation. Laboratory management will need to communicate with agency management to work out the specifics of some authorities.

And, of course, the U.S. Department of Commerce (including CUFT) and the FLC are both available to assist laboratories.

DO THE PARTICIPANTS HAVE ANY CATEGORIES TO ADD TO THIS LIST?

WHAT DO THE PARTICIPANTS THINK IS THE RELATIVE ROLE OF THE VARIOUS GOVERNMENT ACTORS?

NOTE: IF THE OPTIONAL READING BY MADIQUE HAS BEEN USED, WHAT RELEVANCE DO THE PARTICIPANTS THINK THAT THIS PERSPECTIVE ON PRIVATE SECTOR INNOVATION HAS FOR TRANSFER ACTIVITIES IN FEDERAL LABORATORIES?

PRIVATE SECTOR TRANSFEREE PARTICIPANTS

Now let's take a look at the private sector for a moment.

Transparency 11-3: Private Sector Transferee Participants

The champion is at the top of the list, as on the previous transparency. Remember, someone has to believe in the technology and has to push it; and this is the champion's role.

The technical staff on the private sector side is, of course, involved. Examples are R&D and engineering personnel, finance staff, legal staff, senior division and corporate staff, production management, brokers, and agents. Brokers and agents are explicitly

identified here because it is a growing practice for the private sector to engage brokers or agents to assist in transferring a technology (either in or out of a firm).

And, of course, you have entrepreneurs. In many private sector enterprises (the smaller ones particularly), the champion and the entrepreneur may be the same person. In this case, the first and last element on the list would be the same. This is one of the hallmarks of entrepreneurship in smaller enterprises. Indeed, if the entrepreneur does not become a champion for the technology at some point, it is very likely that the technology will not be exploited successfully, and certainly not fully.

In some cases, it may be that laboratory staff may become entrepreneurs. This can be a very important and effective form of transfer.

There are many parallel channels of professional communication between the public and private sectors such as technical staff, bench scientists, engineers, and legal staff. Professional organizations and meetings can be used by these professionals as forums for technology transfer--as occasions to meet and discuss transfer opportunities.

ORTAs and other laboratory personnel have an enormous responsibility to communicate with their peers as a method of generating technology transfer opportunities. This is essentially a marketing function for laboratories, making people aware of your interest as well as what you have.

We are also talking about communication channels <u>between and among</u> these participants, or actors. In the private sector, communication channels have been created between functions. Comparable formal channels do not generally exist in the public sector to facilitate technology transfer. So, in many cases, coordination of activities and communication may necessarily be informal or may need to be structured.

It is a great challenge to laboratory management (maybe the biggest challenge) to establish communications in channels where government generally does not have an organization or responsibility parallel that to found in the private sector. Otherwise, potential transfers may not occur.

Who bridges the gaps? At a minimum a contact person will be required. This will probably be the ORTA or the technology manager, but it may also fall to a champion or transfer agent brought into the the laboratory or the firm.

DO THE PARTICIPANTS HAVE ANY CATEGORIES TO ADD TO THIS LIST?

WHAT DO THE PARTICIPANTS THINK IS THE RELATIVE ROLE OF THE VARIOUS PRIVATE SECTOR ACTORS?

WHAT ORGANIZATIONAL FORMS AND COMMUNICATIONS CHANNELS DO THE PARTICIPANTS THINK ARE NECESSARY FOR EFFECTIVE TRANSFER?

Third-Party Participants

Transparency 11-4: Third-Party Participants

We have talked about government and private sector participants, but we haven't said much about third-party participants directly. Let's do so now.

Regulatory agencies (those that promulgate economic, safety, and other regulations) are sometimes seen as catalysts to innovation and sometimes seen as brakes on innovation and technology transfer. Indeed, sometimes they are one and sometimes the other.

Other participants from the third-party category are brokers and agents. These are professionals who dedicate themselves primarily to transferring technology for clients--either transferring it out or transferring it in. Laboratories don't need to be experts in every area of transfer and should use what's outside as well as inside to make things happen, and happen as quickly as possible and most effectively with the broadest possible beneficial effects.

Financial institutions in the United States are usually implicit, but sometimes explicit, participants in technology transfer and innovation. Once more, you find them as both catalytic and constraining, and sometimes the same institution is in both roles at

the same time. But, financial institutions do play a role, and often the financing will be crucial to a successful transfer.

Some governmental entities also serve as third-party participants. This category includes such entities as Congress, the Office of Special Trade Representatives, the Office of Science and Technology Policy at the White House, and DOD and the Department of Commerce in their export licensing activities.

Lastly, prominent research universities are also increasing their technology transfer efforts. Joining with universities as partners presents additional technology transfer opportunities for Federal laboratories.

HOW DO THE PARTICIPANTS FEEL ABOUT THIRD-PARTY PARTICIPANTS? NOTE: IF THE OPTIONAL READING BY FAWCETT HAS BEEN USED, THIS SHOULD SERVE AS A BASIS OF DISCUSSION.

SEGMENTED INNOVATION

Transparency 11-5: Multiple Firms in a Single Innovation Process

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Let us now turn our attention to the fact that in the private sector it is possible to have multiple enterprises engaged in a single process of innovation. A hypothetical case is illustrated in this diagram.

With respect to the initial stage of innovation, for example, there are independent inventors, invention companies (companies that do nothing but turn out inventions), and companies that buy patents and other forms of invention and do nothing more than license them to others. In our hypothetical construct of a segmented innovation process, we have assigned the inventive job to Firm A, which is represented by the small box on top.

In the second box--the biggest dotted line box on the chart--we find a second enterprise called Firm B that is engaged in development and production work.

And finally, we see Firm C, which is engaged in the marketing activity associated with getting the product to the customer, without which we have no innovation (by definition).

This is not, of course, the only way firms can be allied, arranged, or related to create a process of innovation. Consider for example the prototype function assigned to Firm B. There are firms in the United States that make a living building prototypes. They don't conceive, market, or manufacture anything; they build prototypes.

Testing is also often externalized. Sometimes it has to be externalized because only certain people are licensed to test against a regulation. In addition, if a firm does its own testing, the results are often not as believable. Testing is another area of opportunity for Federal labs to contribute to the innovation process.

Sony in Japan provides a concrete example of segmented innovation. If you look at the history of Sony, you will find that for many years it externalized an enormous portion of the elements of the innovation processes in which it was involved.

Sony bought ideas for products and relied largely on U.S. consultants for its engineering. It was not until the middle to late '70s that Sony achieved the capacity to do the design and production engineering of its product line.

The segmentation of functions in the innovation process is important to technology transfer activities because it shows that the private sector already engages in inter-firm transfers, suggests opportunities for Federal laboratories to participate in similar processes, and demonstrates that the laboratories may need to deal with more than one firm in completing a transfer.

In all cases of technology transfer to the private sector, Federal laboratories are engaged in a segmented innovation process, because they are providing inputs for development and eventual commercialization that will be carried out by others. Since most transfers will not be discrete handoffs, but rather protracted efforts in which a technology or an area of technological investigation is in some stage of development, technology in the transfer mode necessarily falls under a joint management structure. This is why it is absolutely

critical for Federal laboratories to provide actors and attendant management structures (formal or informal) that parallel the private sector actors and structures involved in transfer efforts.

NOTE: INDIVIDUAL FIRMS OFTEN RELY ON EXTERNAL SOURCES TO PROVIDE CERTAIN SEGMENTS, OR COMPONENTS, OF THE INNOVATION PROCESS. FEDERAL LABORATORIES ARE AN OBVIOUS POTENTIAL SOURCE OF MANY OF THE COMPONENTS OF THE PROCESS.

ASK PARTICIPANTS TO IDENTIFY IN THE DIAGRAM THE AREAS (I.E., SMALL BOXES) IN WHICH THE LABORATORY CAN BEST CONTRIBUTE TO THE INNOVATION PROCESS. SHADE THESE AREAS IN WITH A MARKER ON THE TRANSPARENCY.

ASK FOR SUGGESTIONS ON AREAS OUTSIDE THE BOXES THAT CAN BE ADDED. SOME EXAMPLES MIGHT INCLUDE: COOPERATIVE RESEARCH OUTSIDE OF BLOCK "A" THAT LEADS TO CONCEPTION AND INVENTION AND POSSIBLY THROUGH PROTOTYPE; TECHNICAL ASSISTANCE ON A COOPERATIVE ARRANGEMENT IN THE FIRST PRODUCTION PHASE; USER FACILITIES FOR INVENTION, PRELIMINARY ENGINEERING, PROTOTYPE BOXES, ETC.

NOTE: USE THIS EXERCISE TO GENERATE DISCUSSION ABOUT GENERAL AND SPECIFIC OPPORTUNITIES FOR LABORATORIES TO PARTICIPATE.

NOTE: REMOVE THE TRANSPARENCY AND ASK THE PARTICIPANTS WHETHER THEY HAVE ANY FINAL COMMENTS ON ACTORS IN THE CONTEXT OF THE REQUIRED READING BY BRADBURY.
