Unit 19

TITLE: TECHNOLOGY TRANSFER INCENTIVES

PURPOSE: This unit provides information on incentives to encourage agency personnel, laboratory management, and laboratory personnel to participate in technology transfer efforts.

OBJECTIVES: Upon completion of this unit, participants will:

- Be familiar with incentives for agencies and laboratory management to participate in technology transfer activities
- Understand that the legislation provides the laboratories with the express authority to engage in technology transfer activities
- Understand more fully that transferring technology contributes to the production of public goods
- Be familiar with the direct incentives to transfer provided by legislation
- Be aware of the many indirect benefits to laboratory personnel that result from technology transfer efforts.

MATERIALS:

Transparency 19-1: Technology Transfer Incentives

Transparency 19-2: Incentives for Agencies

Transparency 19-3: Direct Incentives for Laboratory Management

Transparency 19-4: Indirect Incentives for Laboratory Management

Transparency 19-5: Incentives for Scientists and Engineers

Transparency 19-6: Legislation

Transparency 19-7: Creation of Public Goods

Transparency 19-8: Direct Incentives for Scientists and Engineers

Transparency 19-9: Indirect Incentives for Scientists and Engineers

Transparency 19-10: Technology Transfer Incentives Serve the Public Interest

Handout 19-1: Matrix: Specific Authorities: Incentives

REQUIRED READING: E.J. Soderstrom, "New Initiatives in Technology Transfer: Introducing the 'Profit Motive'," pages 359-375 in Utah Innovation Foundation (Salt Lake City), First International Technical Innovation and Entrepreneurship Symposium, 1986.

OPTIONAL READING: Handout 19-1: Matrix: Specific Authorities: Incentives

NOTES TO INSTRUCTOR:

1. Although this unit touches upon some of the themes presented in Unit 2 (Technology Transfer Legislation), it provides a good wrapup session to initiate action.

2. The required reading by Soderstrom provides some interesting observations on technology transfer in general and discusses some of the specific mechanisms instituted at Oak Ridge National Laboratory to enhance and supplement Congresssionally mandated incentives. The handout for optional reading is the same as Handout 2-4.

ESTIMATED TIME: 15 minutes for presentation
30 minutes with discussion

Unit 19

TECHNOLOGY TRANSFER INCENTIVES

Transparency 19-1: Technology Transfer Incentives

NOTE: PRESENT PURPOSE AND OBJECTIVES OF THIS UNIT.

INCENTIVES FOR AGENCIES

Transparency 19-2: Incentives for Agencies

Benefits to agencies resulting from technology transfer efforts at their laboratories include contributing to the public good, Congressional approval, increased prestige, and stronger laboratories with enhanced ability to conduct mission work and to retain personnel.

Transferring technologies out of Federal laboratories to the private sector and into the marketplace enhances the creation of public goods because these activities contribute to jobs, growth, and U.S. industrial competitiveness.

Agencies will receive Congressional approval if they follow the Congressional mandate to transfer technologies, as expressed in legislation passed since 1980. These laws require each agency to prepare an annual report for Congress (submitted with the agency's annual budget) on the technology transfer activities of its laboratories by demonstrating value to the public beyond the mission effort.

Successful technology transfers will bring increased prestige to the agencies.

And finally, stronger laboratories will result from the enhanced ability to conduct mission work and to retain personnel. The ability to conduct mission work will be enhanced because laboratory scientists and engineers can increase their expertise through added access to scientists and engineers working in similar or related fields and through heightened creativity induced by innovation awareness.

The ability to retain personnel will be increased because some employees will be more satisfied with their jobs. The technology transfer legislation allows them more freedom to work on things they are interested in that may have commercial potential, allows them to work with peers and have access to equipment in private sector and other public sector labs, and gives them the ability to see their ideas materialize through commercialization.

NOTE: ENCOURAGE DISCUSSION OF THESE AGENCY INCENTIVES AND ASK FOR ADDITIONS TO THIS LIST.

INCENTIVES FOR LABORATORY MANAGEMENT

Transparency 19-3: Direct Incentives for Laboratory Management

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Laboratory management receives both direct and indirect benefits from technology transfer efforts at their laboratories.

The first two direct incentives for supporting technology transfer are essentially the same as the first two incentives for the agencies. Technology transfer contributes to the creation of public goods by leading to more jobs, economic growth, and increased competitiveness of U.S. products in world markets.

Secondly, Congress has authorized, in fact has mandated, Federal labs to try to transfer the technologies they develop.

Direct incentives to support technology transfer activities also come in the form of financial benefits to the laboratory, generally from royalties or private sector support through cooperative R&D agreements and user fees. Laboratories whose personnel successfully commercialize technologies receive a portion of the royalties.

Royalty income received by government-operated laboratories must be used to cover administrative and licensing expenses, with any remaining funds used to reward lab employees; to further scientific exchange among an agency's labs; for education of laboratory personnel; and for other activities that increase the licensing potential of the laboratories.

Royalty income received by nonprofit contractor-operated laboratories should also be used to cover patenting costs, licensing costs, and other associated administrative expenses. Any remaining funds must be used for mission-related R&D, education of laboratory personnel, and activities that increase the licensing potential of laboratory technologies.

Laboratories may also generate additional budgetary support for primary mission and other work through cooperative R&D agreements with the private sector. Cooperative R&D agreements are an important mechanism for transferring knowhow from laboratory to private sector personnel.

NOTE: ENCOURAGE DISCUSSION OF THESE MANAGEMENT INCENTIVES AND ASK FOR ADDITIONS TO THIS LIST.

Transparency 19-4: Indirect Incentives for Laboratory Management

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Laboratory management also receives indirect benefits as a result of technology transfer efforts, including:

- Increased prestige
- Increased productivity from employees (through enhanced knowhow and creativity)
- Greater flexibilty in the management of internal resources (personnel and money)
- Greater ability to retain programs and people during times of budgetary restraint
- Greater ability to keep people from quitting out of frustration at not being able to develop their ideas
- Greater ability to retain people in circumstances that have given rise to private sector opportunities.

INCENTIVES FOR SCIENTISTS AND ENGINEERS

Transparency 19-5: Incentives for Scientists and Engineers

Incentives for scientists and engineers to participate in technology transfer efforts include:

- Legislation that provides the express authority for engaging in technology transfer activities
- Personal contribution to the public good
- Direct incentives provided by legislation
- Indirect incentives resulting from implementation of the legislation.

Technology Transfer Legislation

Transparency 19-6: Legislation

Federal technology transfer legislation gives laboratory personnel the express authority to participate in technology transfer activities and specifies that agency and laboratory management should look favorably upon these activities.

The Federal government first stated its policy with regard to technology transfer in the Stevenson-Wydler Act of 1980 (Public Law 96-480). This Act specifies that:

> It is the continuing responsibility of the Federal government to ensure the full use of the results of the Nation's Federal investment in research and development. To this end the Federal government shall strive where appropriate to transfer Federally owned or originated technology to State and local governments and to the private sector.

In 1986, the Federal Technology Transfer Act of 1986, which amended Stevenson-Wydler, further emphasized the intent of Congress that technology be transferred to parties that will use it to produce and market a product, even while the Federal laboratory pursues its mission responsibilities. To make its position clear, Congress declared that "technology transfer...is a responsibility of each laboratory science and engineering professional" and that:

> Each laboratory director shall ensure that efforts to transfer technology are considered positively in laboratory job description, employee promotion policies, and evaluation of the job performance of scientists and engineers in the laboratory.

NOTE: SOME LABORATORY PERSONNEL MAY NOT SEE LEGISLATION THAT MANDATES PARTICIPATION IN TECHNOLOGY TRANSFER EFFORTS AS AN INCENTIVE TO PARTICIPATE; HOWEVER, OTHER LABORATORY PERSONNEL MAY SEE A LEGISLATIVE MANDATE AS AN IMPORTANT INCENTIVE AND AS A JUSTIFICATION FOR PARTICIPATION IN THESE ACTIVITIES.

Technology Transfer Contributes to the Public Good

Transparency 19-7: Creation of Public Goods

NOTE: PUBLIC GOOD IS DEFINED IN MORE DETAIL IN UNIT 2 (TECHNOLOGY TRANSFER LEGISLATION).

A second incentive for scientists and engineers to participate in transfer efforts is that technology transfer contributes to the public good. Congress believes that technology transfer from Federal laboratories is a way to enhance the creation of public goods by improving the economic, environmental, and social well-being of the United States. Technology transfer is expected to lead to increased public and private sector productivity, increased industrial innovation, enhanced industrial competitiveness of U.S. products in world markets, the creation of new industries and jobs, improved public services, and a reduction in costs of public services--goals that basically represent public goods.

Direct Incentives

Transparency 19-8: Direct Incentives for Scientists and Engineers

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The technology transfer legislation and Executive Order 12591 allow a number of incentives to encourage scientists and engineers to transfer technology. These direct incentives include:

- Financial rewards
- The ability to claim title to one's invention if the contractor or Federal agency is not planning to try to commercialize it

- The ability to work with people from industry and universities with similar areas of interest and expertise through:
  - personnel exchanges
  - cooperative R&D agreements
- The ability to participate in efforts to commercialize inventions.

NOTE: HANDOUT 19-1, THE MATRIX ON INCENTIVES, PROVIDES DETAILS ON DIRECT INCENTIVES PROVIDED BY LEGISLATION AND CAN BE USED AS A BASIS OF DISCUSSION. EMPHASIZE INFORMATION APPROPRIATE TO THE PARTICIPANTS' LABORATORY.

Financial Rewards

The technology transfer legislation provides incentives and awards to encourage technology transfer activities at the government-operated and nonprofit contractor-operated laboratories.

With respect to government-operated laboratories, royalties and cash awards are the financial incentives provided to laboratories and laboratory personnel by the legislation. A laboratory's governing agency must distribute royalties or other income received from licenses. Inventors receive at least 15 percent of the royalties (or other income) from a technology, if the inventor was employed by the agency when the technology was developed. The agency must distribute royalty payments to inventors and transfer the remaining royalties to the laboratories, with the major portion going to the laboratory where the technology was developed.

Royalty payments to employees do not affect regular compensation or awards, and payments continue after the inventor leaves the laboratory or agency. There is a $100,000 annual limit per person, unless the President approves a larger award.

Any Federal agency with annual R&D expenditures totalling more than $50 million at all of its government-operated laboratories must develop and implement a cash awards program. These awards will be used to reward personnel for outstanding work that leads to commercialization of technologies or makes a significant contribution to laboratory mission responsibilities.

With respect to nonprofit contractor-operated laboratories, contractors are required to share royalties with the inventor.

NOTE: THE PERCENTAGE OF ROYALTIES GOING TO INVENTORS AT CONTRACTOR-OPERATED LABORATORIES IS NOT SPECIFIED IN THE LEGISLATION. THE LEGISLATION DOES NOT REQUIRE THAT CASH AWARDS PROGRAMS BE ESTABLISHED AT CONTRACTOR-OPERATED LABORATORIES.

NOTE: MORE DETAILED INFORMATION ON ROYALTIES IS FOUND IN HANDOUT 19-1, THE MATRIX ON INCENTIVES.

Inventor Ownership

If the nonprofit contractor or Federal agency does not choose to retain title to an invention, the inventor may be allowed to retain title. For technologies developed at government-operated laboratories, if the governing Federal agency does not intend to promote commercialization of the technology (and the inventor is a government employee or was when the technology was developed), the agency shall allow the inventor to retain title to the technology. For technologies developed at nonprofit contractor-operated laboratories, if the contractor does not plan to promote commercialization of the technology, the contractor can ask the agency to allow the inventor to own the technology. In both cases, the government retains a nonexclusive, nontransferrable license to use the invention or have it used for its purposes.

Ability to Work With Peers

The legislation provides mechanisms for laboratory employees to work with people from industry and universities. These mechanisms include personnel exchanges and cooperative R&D.

Congress believes that increased interactions among these groups should lead to increased expertise in the laboratories, universities, and industy, which will lead to increased innovation, enhanced productivity, the creation of new industries and jobs, and enhanced competiitiveness of U.S. products in world markets.

The technology transfer legislation and the Executive Order encourage personnel exchanges among academia, industry, and Federal

laboratories. These exchanges allow lab scientists and engineers to work with people from industry and universities with similar areas of interest and expertise.

NOTE: SOME SCIENTISTS AND ENGINEERS WILL NOT SEE THE ABILITY TO PARTICIPATE IN PERSONNEL EXCHANGES AS AN INCENTIVE. OTHERS WILL FIND IT A USEFUL JUSTIFICATION FOR ACTIVITIES. THE PRIMARY PURPOSE OF PERSONNEL EXCHANGES IS BECAUSE TECHNOLOGY IS BEST TRANSFERRED BY PEOPLE WHO HAVE BEEN DIRECTLY INVOLVED IN THE TECHNOLOGY'S DEVELOPMENT. ON THIS POINT, SEE UNIT 5, KEY CONCEPT 5, TECHNOLOGY TRANSFER IS A PEOPLE PROCESS.

The ability to work with the private sector through cooperative R&D agreements is another incentive for many bench scientists and engineers. Such agreements allow laboratory personnel to work with private companies to do further research and attempt to solve problems in areas of mutual interest and to further develop technologies of mutual interest.

The Executive Order of April 1987 requires the agencies to give their government-operated laboratories the authority to enter into cooperative R&D agreements. The laboratories have been given this authority in an effort to avoid long delays in obtaining approval from agencies. The government-operated laboratories are the only Federal laboratories given clear authority to enter into these agreements; however, the Executive Order urges the agencies to encourage and facilitate collaboration at all Federal laboratories.

NOTE: SOME SCIENTISTS AND ENGINEERS WILL SEE THE ABILITY TO WORK WITH THE PRIVATE SECTOR UNDER COOPERATIVE R&D AGREEMENTS AS AN INCENTIVE; OTHERS MAY NOT. MORE DETAILED INFORMATION ON COOPERATIVE RESEARCH IS FOUND IN UNIT 12 (COOPERATIVE RESEARCH).

Assist Commercialization

The recent legislation gives scientists and engineers at government-operated laboratories the ability to participate in efforts to commercialize technologies they developed, as long as agency standards of conduct are met. This provision allows those scientists

and engineers who want to continue to be involved in the developement of their technology, often after it has been licensed, to do so.

NOTE: SOME SCIENTISTS AND ENGINEERS WILL SEE THE ABILITY TO PARTICIPATE IN EFFORTS TO COMMERCIALIZE THEIR TECHNOLOGIES AS AN INCENTIVE; OTHERS MAY NOT.

NOTE: THERE ARE NO SPECIFIC PROVISIONS IN THE TECHNOLOGY TRANSFER LAWS RELATED TO SIMILAR ACTIVITIES BY EMPLOYEES OF CONTRACTOR-OPERATED LABORATORIES.

Indirect Incentives

Transparency 19-9: Indirect Incentives for Scientists and Engineers

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There are a number of indirect incentives for bench scientists and engineers to participate in technology transfer efforts. These incentives include:

- The ability to see one's ideas materialize
- Increased expertise (through access to private sector and university knowhow)
- Increased prestige
- Increased job security (particularly in cases where the work a scientist or engineer is doing is being supported in part by the private sector)
- Increased creativity (through innovation awareness)
- Heightened probability of promotion
- Diversification of research activity
- Access to private sector and university equipment
- New context for publication
- Perks such as travel
- Entreprenurial spirit can be exercised without needing to leave lab employment
- Potential opportunity to participate in ownership and management of a company
- Potential opportunity to start one's own business.

NOTE: SCIENTISTS AND ENGINEERS MAY NOT AGREE THAT SOME OF THESE ARE INCENTIVES TO PARTICIPATION IN TECHNOLOGY TRANSFER ACTIVITIES; IN FACT, SOME MAY SEE SOME OF THESE AS

DISINCENTIVES. THIS LIST SHOULD BE USED FOR DISCUSSION PURPOSES. SCIENTISTS AND ENGINEERS MAY ALSO WANT TO ADD TO THIS LIST.

NOTE: THE ORTA OR TECHNOLOGY MANAGER CAN AND SHOULD SERVE AS A BUFFER, ALLOWING DEGREES OF PARTICIPATION IN TECHNOLOGY TRANSFER ACTIVITIES BASED ON THE DESIRES OF INDIVIDUAL SCIENTISTS AND ENGINEERS. IF THESE INDIVIDUALS INTEND TO ACT AS A BUFFER, IT MAY BE REASSURING TO THE SCIENTISTS AND ENGINEERS TO KNOW THAT. THEY SHOULD BE ENCOURAGED TO USE THE ORTA OR TECHNOLOGY MANAGER AS A BUFFER.

INCENTIVES AND THE PUBLIC INTEREST

Transparency 19-10: Technology Transfer Incentives Serve the Public Interest

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Congress has offered several important incentives to encourage more active participation in the transfer of technology from the Federal laboratories to the private sector. However, the purpose of the financial incentives should not be misconstrued. The sole purpose of their existence is to increase activities that will serve the public interest.

The financial incentives for scientists and engineers should not be understood as payments for services rendered. They were instituted not to compensate the scientist or engineer for his efforts, but rather because it was found that some system of incentives needed to be instituted to elicit transfer activities at the bench level commensurate with Congress' understanding of the dimensions of Federal laboratory transfer potentials. Mandates can generate a certain level of activity, but mandates plus incentives can generate a higher level of activity.

Financial incentives for laboratories were not instituted to provide increased revenues for the laboratories, although this is an automatic consequence of their existence. Rather, the incentives are there to encourage a higher level of transfer activity and to provide additional funds for transfer activities. Laboratory transfer activities should not be looked at as a money-making opportunity, but rather as a mandated mission to participate in producing public goods.

Although laboratory management must necessarily be concerned about the cost of specific transfer efforts, they cannot be judged in terms of strict cost/benefit criteria.

NOTE: REMOVE TRANSPARENCY FROM SCREEN.

NOTE: DEPENDING ON THE NATURE OF THE AUDIENCE, THE INSTRUCTOR MAY WISH TO USE THE HANDOUT FOR INITIATING ADDITIONAL DISCUSSION AT THE END OF THE SESSION. THE REQUIRED READING BY SODERSTROM SHOULD ALSO BE DISCUSSED AS ONE LABORATORY'S APPROACH TO THE IMPLEMENTATION OF MECHANISMS TO ENHANCE AND SUPPLEMENT CONGRESSIONALLY MANDATED INCENTIVES.
