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Federal Laboratory Consortium for Technology Transfer -A National Resource

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FEDERAL LABORATORY CONSORTIUM FOR TECHNOLOGY TRANSFER–A NATIONAL RESOURCE

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ABSTRACT

Our nation is currently facing a multitude of social and economic problems that require immediate solutions if our standard of living is to remain at its present level. Many of these solutions can be found through the proper utilization of existing and developing science and technology resources. During the past decades, we have invested billions of dollars in research and development (R&D). Last year alone, nearly $24 billion in R&D was expended by major agencies of the federal government. A significant portion of this R&D was accomplished by the laboratories of the federal government. Within these laboratories, technology already exists that can be adapted to address specific areas of concern faced by state and local governments. In essence, this paper will describe the Federal Laboratory Consortium for Technology Transfer which has as its major objective the transfer of existing expertise and capability within these federal laboratories to help solve problems in the public and private sector.

INTRODUCTION

A great many social and economic problems are being encountered by our country today which could be resolved through proper use of existing and developing scientific and technology resources. The significant investment this country has made in research and development (R&D), if properly adapted to address specific areas of concern faced by state and local governments, could greatly contribute to the resolution of many problems. This paper addresses the current effort to make available to state and local goverments the vast science and technology resource available within the federal laboratories. In essence, I will be describing the Federal Laboratory Consortium for Technology Transfer which has as its major objective the transfer of existing expertise and capability within these federal laboratories to help solve problems in the public and private sector.

First, however, I would like to describe a problem faced by many local communities where technology originally developed for the space program has proven extremely valuable in the public and private sector.[1] Many of you are well aware that traditional firefighters' breathing apparatus is heavy and cumbersome. The excessive weight can cause a firefighter to collapse from heat and exhaustion. Using technology originally developed for rocket motor casings, the NASA Johnson Space Center developed a lightweight air bottle. The resulting breathing apparatus weighs 40% less than existing equipment. In 1976, Boston became the first municipality in the nation to introduce the NASA-developed breathing apparatus as regular equipment.

My primary purpose in telling you about this case is to acquaint you with the need for technology transfer. A multitude of technical as well as social and economic problems face our nation. And, if our standard of living is to remain at its present high level, we must pay immediate and serious attention to such problems. Among the more important national concerns facing all levels of government today are the energy crisis, unemployment, and high prices. An overabundance in some areas and deficiencies in others provides the fuel for continued unrest and uneasiness in the minds of many public officials and citizens alike. Rapid changes in public needs and private wants have brought about critical intergovernmental issues. As can be seen by the example above, the costs associated with addressing these problems can be extremely high and, in many instances, requires the use of technology, much of which very likely already exists but has not yet been applied.

Obviously, every available science and technology resource must be tapped if timely solutions are to be found to the nation's problems. The problems are complex and will require partnerships between state and local governments, the federal government, industry and universities. No one sector can provide all the answers. Industry, operating on a profit motive, can satisfy the wants of the average citizen, but what about the needs of state and local governments? The likelihood of industrial solutions to local government problems appears minimal due to the lack of a developed and aggregate market. As far as our colleges and universities are concerned, in general, they also are not designed nor intended to offer the total spectrum of technical resources required to respond to the problems of these government entities. There does exist, however, within our federal government laboratories, a large national investment in scientific facilities, equipment, capabilities, and experience. These laboratories, when properly mobilized, could possibly provide the solutions to many of our nation's problems.

FEDERAL LABORATORIES AS A RESOURCE

During the past decade, the federal government has spent more than $200 billion for research and development (R&D). Approximately $24 billion was spent in fiscal year 1977 for R&D purposes. Plant expenditures for R&D facilities and

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equipment were expected to reach approximately $4 billion during fiscal year 1977. These monies represent an investment made by each taxpayer in the United States. Not all federal government R&D funds are spent intramurally; a very large percentage is spent by the private sector. However, a good portion of these funds is invested each year in the federal laboratories. In fiscal year 1977 alone, these federal laboratories spent $6 billion on R&D.[2]

The numerous federal laboratories can be segregated into three major categories:

1. Mission agencies, such as the Department of Defense (DoD), which require high technology to develop equipment and other capabilities to meet national objectives.
2. Mission agencies, such as the Department of Transportation, which have an intrinsic requirement to work with other government agencies, i.e., federal, state and local.
3. Federally funded R&D centers which are not part of the federal government but which operate under federal funds. For example, the National Laboratories operate under contract to the Department of Energy. However, this type laboratory is subject to different guidelines than federally owned and operated laboratories.

The latest report on federal laboratories indicates that there are will over 800 federal laboratories and centers located throughout the nation.[3,4] This represented, in 1972, a work force of 260,000 people and an intramural R&D budget approaching $7 billion. Over the years, a sizable amount of technology has been developed that could be adapted to help solve some of our country's problems. However, in many cases, no deliberate or active effort has been made to take full advantage of the problem-solving potential of existing and emerging technology.

At this point in time there is one dominant justification for making the technical resource represented by the federal laboratories available to state and local governments: A greater return can be had on the taxpayer's investment in science and technology through more effective primary *and secondary* use of R&D results. State and local governments are very much aware that many of their problems can be solved only through the use of science and technology. However, these agencies cannot afford to invest large sums in R&D and, therefore, it is not a high priority item in their budgets. Federal government laboratories may not have the technology needed by these government agencies to solve all their problems, but substantial public investment in R&D has been made and technologies do exist and are being developed that could fill important gaps.

If the productivity of state and local government can be increased through use of these federal laboratories, it is believed that industry, acting as the commercial link in the process, can also benefit from such an expanded role of the federal laboratories. These laboratories can offer a large amount of technology not currently or widely available in the private sector and, if this technology has commercial potential, a transfer may prove economically possible.

Federal Laboratory Consortium

The next question is, how can the resource represented by these labs be made available? Federal laboratories are accountable to many federal government agencies, and no formal integrating management system exists within these labs to ensure that the technology transfer and utilization process is coordinated and productive. There is, however, an informal Federal Laboratory Consortium for Technology Transfer which currently consists of more than 150 of the largest federal government laboratories and centers from a number of high technology agencies.

This Consortium system is decentralized and can respond to virtually any technological problem. Clearly, the laboratories in this system represent the complete spectrum of federal R&D activity and a national resource for assistance to state and local governments. The task ahead is to implement the Federal Laboratory Consortium as a science and technology delivery system which can effectively coordinate and make use of these capabilities in the national interest and for the public good.

The Consortium actually had its beginning in the summer of 1971. At that time eleven Department of Defense laboratories met at the Naval Weapons Center, China Lake, California, to determine common methodologies in finding greater uses for technical knowledge developed for military purposes. These eleven labs formed an informal affiliation called the DoD Technology Transfer Laboratory Consortium which currently consists of 54 members. In November 1975, these and all other federal laboratories were invited to join a Federal Laboratory Consortium (FLC) for Technology Transfer which was patterned after the original DoD affiliation. The FLC membership currently consists of 156 laboratories represented by 78 technology transfer coordinators within nine federal agencies. This informal organization represents a technical work force of approximately 100,000 people; a national investment of at least $6 billion, and an annual expenditure of nearly $4 billion.

The basic objective of the FLC is to design, develop and implement, on a systematic basis, mechanisms which facilitate the application of unique mission agency federal laboratory capabilities to nationally defined problems so that publicly funded R&D resources are made widely available on a cost-effective and timely basis. Special emphasis is given to problems associated with the intergovernmental use of federal laboratories and centers for the solution of domestic problems at state and local government levels and integration with the program elements and R&D planning process of federal agencies.

FLC operation is aimed at eliminating or at least minimizing the effects of a multitude of barriers and constraints that hamper the technology transfer efforts of the federal laboratories. The FLC emphasizes person-to-person communication between the civilian sector users and the resource people in the federal laboratories. The development of a well organized information system and the continuous involvement of the users in the problem definition and technology transfer phases, along with the discrete use of

linking agents or technology transfer brokers to bridge the communication gap between researchers and users, represents the core activity of the FLC.

The most important part of this federal laboratory network is its method of operation. The most obvious question when one looks at the federal laboratory system is, how can anyone interface effectively with such an immense and diverse resource? Regardless of whether you are a federal, state or local government user, or industry, or another laboratory, it is an extremely complex interface. Figure 1 is a conceptual schematic of this network according to divisions. The diagram is an attempt to show that there are some reasonable mechanisms to the entire network which may make laboratory technology more accessible.

The four divisions on the periphery of the ellipse are: geography, user needs, mission and technology areas. The mission division is a traditional mission agency notion .... Department of Transportation laboratories respond to transportation needs, Energy Research & Development Administration laboratories respond to energy needs, etc. There are obviously inputs to the system through the mission division, but for technology transfer purposes, it may not represent the best entry since other agencies may have similar technical activities as would be found in a mission agency.

Looking at the technology areas, one finds within the FLC a technology area coordination system called CONTAC which attempts to define the laboratories in terms of technology areas. CONTAC stands for CONtact for Technological Application Coordination. Many technology areas currently identified with certain laboratories can be seen in Figure 2. A resource directory is available which allows a user, whether public or private, to find out what is generally available in the laboratory system.(5) It is interesting to note that there is no directory in existence that addresses the total spectrum of capabilities within the laboratories.

The user needs division is an input mechanism which attempts to make the federal laboratory system aware of the needs of potential users. One mechanism currently used is a monthly FLC newsletter that makes user requirements known to Consortium representatives. This and other planned efforts are combined with program linkages to the public sector implemented through the Intergovernmental Science Program at the National Science Foundation (NSF).

The geographical division is a regional network designed to aid state and local governments more directly (Figure 3). Within each FLC region the laboratories maintain a close working relationship with the existing NSF intergovernmental activities previously mentioned. These regional activities form a viable technology transfer network. If a person in a state or local government has a problem, he can interact with someone locally and not become too involved in the national network unless there is some overriding reason which makes it necessary to do so.

To utilize all available resources to solve emerging national problems, there must be greater interaction and communication between the federal laboratory system and local levels of government, as well as the private sector. It is a fact that the federal laboratory system is an important public investment, and only time and dedicated effort will tell if this sytem, when viewed as a national science and technology delivery system, is successful.

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ILLUSTRATIONS

Figure 1. Conceptual Schematic of Technology Transfer Network.
Figure 2. FLC CONtacts for Technological Area Coordination (CONTAC) Labortories.
Figure 3. Federal Laboratory Consortium Regions.

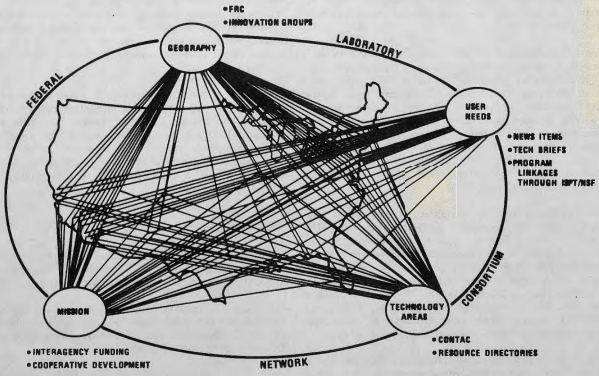

Figure 1. Conceptual Schematic of Technology Transfer Network.

ATMOSPHERIC SCIENCES TECHNOLOGY	NASA/Wallops Flight Center
BIOMEDICAL TECHNOLOGY	Harry Diamond Laboratory
BUSINESS ADMINISTRATION PRACTICES	Army Construction Engineering Research Laboratory
COMMUNICATIONS	Naval Ocean Systems Center
COMPUTER TECHNOLOGY	NASA/Lewis Research Center
CONSTRUCTION TECHNOLOGY	Army Construction Engineering Research Laboratory
CONSTRUCTION TECHNOLOGY (COLD REGIONS)	Army Cold Regions Research & Engineering Laboratory
DETECTION	Army Night Vision Laboratory
ELECTROTECHNOLOGY	Air Force Avionics Laboratory
ENERGY (ALTERNATIVES)	Los Alamos Scientific Laboratory
ENERGY (SOLAR)	Lawrence Livermore Laboratory
ENERGY (GEOTHERMAL)	Lawrence Berkeley Laboratory
ENERGY (NUCLEAR)	Los Alamos Scientific Laboratory
FIRE	Naval Weapons Center
FOOD SCIENCES	Army Food Sciences Laboratory
HAZARDOUS MATERIALS	Chemical Systems Laboratory
HUMAN RESOURCES R&D	Navy Personnel R&D Center
INVESTIGATIVE PROCEDURES	Federal Bureau of Investigation Laboratory
LAW ENFORCEMENT	Technology Transfer Coordinator
LIBRARY AND INFORMATION SCIENCES	Naval Ocean Systems Center
NAVIGATION AND GUIDANCE (AIR)	Air Force Avionics Laboratory
NAVIGATION AND GUIDANCE (WATER)	Coast Guard R&D Center
NUCELAR TECHNOLOGY	Los Alamos Scientific Laboratory
OCEAN TECHNOLOGY	Civil Engineering Center
ORDNANCE	Naval Explosive Ordnance Disposal Center
POLLUTION (MARINE)	Coast Guard R&D Center
POLLUTION (WATER AND AIR)	Chemical Systems Laboratory
REMOTE SENSING	NASA/Ames Research Center
STANDARDS SCIENCE	National Bureau of Standards
TELECOMMUNICATION	Institute for Telecommunication Sciences
TRANSPORTATION	Transportation Systems Center
URBAN AND REGIONAL TECHNOLOGY	Naval Underwater Systems Center

Figure 2. FLC CONtacts for Technological Area Coordination (CONTAC) Laboratories.

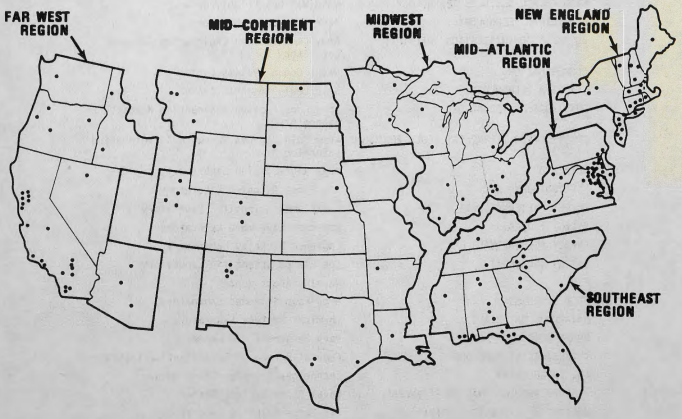

Figure 3. Federal Laboratory Consortium Regions.