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STATE TECHNICAL SERVICES ACT APPROPRIATION AUTHORIZATION

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HEARING BEFORE THE COMMITTEE ON COMMERCE UNITED STATES SENATE NINETIETH CONGRESS

SECOND SESSION

ON

S. 3245

EXTENDING FOR AN ADDITIONAL TWO YEARS THE
AUTHORIZATION OF APPROPRIATIONS UNDER THE
STATE TECHNICAL SERVICES ACT OF 1965

MAY 2, 1968

Serial No. 90-67

Printed for the use of the Committee on Commerce



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STATE TECHNICAL SERVICES ACT
APPROPRIATION AUTHORIZATION

HEARING

BEFORE THE

COMMITTEE ON COMMERCE

UNITED STATES SENATE

COMMITTEE ON COMMERCE

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STATE TECHNICAL SERVICES ACT APPROPRIATION AUTHORIZATION

THURSDAY, MAY 2, 1968

U.S. SENATE,
COMMITTEE ON COMMERCE,
Washington, D.C.

The committee met, pursuant to notice, at 10:20 a.m., in room 5110, New Senate Office Building, the Honorable Hugh Scott presiding.
Present: Senators Scott and Cotton.

OPENING STATEMENT BY THE CHAIRMAN

Senator Scott. The committee will come to order.

The hearing this morning is on S. 3245, to extend for an additional 2 years the authorization of appropriations under the State Technical Services Act of 1965.

Let me first apologize to the various witnesses for being late. I know that you all have your own engagements and I have had some difficulty in working out my own engagements this morning.

I am delighted to have this opportunity to preside at these hearings.

As a member of this committee, I helped draft the original legislation in 1965 creating the State technical services program, which has enabled the Federal Government to join the States in close partnership with universities and other educational institutions to establish technical services programs designed to put into the hands of local business and industry the latest and most useful findings of science and technology. The purpose of this program is to promote industrial modernization and economic growth and thereby to improve the competitive position of American business and industry in world markets. As such, the State Technical Services Act is a vital link in the forward economic growth of Pennsylvania and the Nation.

Today, the State Technical Services Act is in operation, or planned implementation, in each of the 50 States, the District of Columbia, and our U.S. insular territories. I am pleased to note that one of the first planning grants under the act was awarded to Pennsylvania, where approved program appropriations to date, both from the Commonwealth and the Federal Department of Commerce, have now totaled nearly a million dollars. Administered by the Pennsylvania Technical Assistance Program, the State Technical Services Act is making available to Pennsylvania business, commerce, and industry the latest scientific and engineering information disseminated through Penntap's program of seminars, workshops, short courses, firms, and other methods of instruction.

I especially want to welcome among our witnesses Dr. H. LeRoy Marlow of Pennsylvania State University, State director of Penntap,

Staff member assigned to this hearing: John D. Hardy.

and Mr. Ross Renninger, assistant to the vice president of manufacturing, Textile Machine Works, at Reading, Pa., who will describe his firm's successful participation under the State Technical Services Act. I believe it is also worth noting that another Pennsylvanian, Mr. Everett Zurn, chairman of Zurn Industries, Inc., at Erie, is one of 14 highly qualified representatives of commerce and industry selected by the U.S. Secretary of Commerce and now serving on the State Technical Services Public Evaluation Committee, which was created under this act to hold hearings and otherwise to review the effective implementation of this program.

The bill before us today, S. 3245, would extend the State Technical Services Act by authorizing \$7 million in Federal expenditures for fiscal year 1969 and such amounts as may be necessary for fiscal year 1970. As before, Federal money would continue to be matched by the States. I can assure you that S. 3245 will receive this committee's careful consideration and attention.

And I do point out that under the Legislative Reorganization Act of 1946, witnesses may read their statements. They are not required to read their entire statement, unless they wish to. They may summarize or submit oral statements. But we leave that up to the witnesses. However, if you do not wish to read your entire statement, it will appear in the record.

At this point I would like included in the record a statement submitted by Senator Edward V. Long, of Missouri, in support of S. 3245; also a letter from Donald F. Hornig, Director, Office of Science and Technology; and a copy of S. 3245.

(The material referred to above follows:)

STATEMENT BY U.S. SENATOR EDWARD V. LONG IN SUPPORT OF RENEWAL
OF THE STATE TECHNICAL SERVICES ACT

As one of the original co-sponsors of the State Technical Services Act, I am pleased to again express my support for this vital legislation. In my opinion there are good reasons for continuing this program.

First. America today is producing an overwhelming amount of scientific and technological data. A large portion of this data is the result of the massive U.S. research and development programs which are sponsored in Federal agencies. We today face the urgent problems of getting the latest discoveries out of the lab and into the hands of industry and local governments. Until the State Technical Services Act, very little was being done to solve this problem.

Disseminating the new information to industry is extremely difficult. It is a challenge we face which no other generation has had to meet on such a broad scale. The State Technical Services Act is a first step toward meeting this challenge.

Second. The United States is failing to guarantee that a discovery in one field will be made available to scientists and engineers in other fields. The cost of R and D is high. But in the long run the benefits gained from this research would be greatly increased if the new ideas would be made available to all who could possibly use them. A research project may not be a success. But information uncovered from this project may be of great value to scientists and firms in other fields. By providing effective dissemination of information, we can help insure that full benefit will be received from each research project.

Third. We come to the very practical point that 62.7 percent of the total research and development carried on in the United States is paid for by Federal funds. I believe it is logical then that the results of this research should be used to benefit as many citizens as possible. This can only be done by a complete dissemination of the results to all possible users. Again the State Technical Services Act is a first step in the right direction.

Fourth. Research and development is so costly that only larger firms can afford to do their own. Even among the large firms which can afford R and D programs, there is a great possibility that costly duplication can occur. Making available

the latest results of R and D will aid the small firm by giving it the opportunity to better its production methods. Large firms will not have to waste time and money "discovering" something a government grant helped discover a year before. Thus duplication will be greatly reduced. The State Technical Services Act is at work today helping the small businessmen and industries which supply local citizens.

Fifth. Perhaps most important, rapid dissemination of technological information greatly aids the expansion of our economy. By acquiring new information, firms will be able to operate more efficiently, they will be able to produce more, and they will be able to hire more employees. Also easy access to new information will greatly enhance the possibilities of a smoother transition from defense production to other types of production during the post Viet Nam period.

Access to, and use of, technical information will also aid the economy by making it easier for our manufacturers to compete in world markets. Increased and more efficient production will enable us to lower prices and increase foreign sales.

The State Technical Services Act has been designed to meet all five of the problems I have discussed. It stimulates the flow of information to State, regional, and local areas. It provides for the relating of the available information to specific industrial problems and for recommending experts in the various problem areas. The Act is designed to help industry and local economies and is, in the end, a vital aid to the American system of free enterprise. This has been shown to be true in many states. It is certainly true in Missouri.

I am very proud of the progressive efforts Missouri has made under the State Technical Services program. Our program is led by the State Department of Commerce and the University of Missouri's Extension Division. I would like to take this opportunity to commend to this committee the excellent testimony of Dr. C. Brice Ratchford who has helped pioneer this program both for the nation and for Missouri. We in Missouri are very proud of the work Dr. Ratchford and his staff are doing in behalf of our citizens.

Efforts are under way to establish a Central Reference Service for Missouri. This service would use among others the facilities of Washington University in St. Louis and of St. Louis University. It is hoped that the resources of Linda Hall Library in Kansas City will also be available for this project. This library is one of the finest technical libraries in the United States.

The library will work with the universities to receive questions and to refer them to persons who will know the sources for the answers. In this way a firm is directed to the specific sources which will provide answers to particular problems or which will furnish recommendations for improvements.

The goal is to compile a complete list of persons who have the knowledge of these sources. Then an index of all the sources themselves will be compiled.

There are presently over 8,000 manufacturers in Missouri. The Central Reference Service will be available to these manufacturers to aid them wherever possible. Contact work will largely be carried out by industrial extension agents who are part of the University of Missouri's Extension Division. They visit Missouri manufacturers, become familiar with specific problems, help find recommendations for overcoming these problems. These recommendations are based on new technology as it develops. These agents help spread the new information to the manufacturers of Missouri. They are truly industrial missionaries.

The Technical Services program in Missouri also aids in the presenting of scientific papers and the holding of conferences. So far, Technical Services sponsored conferences in Missouri, held in conjunction with universities across the State, have been attended by over 80,000 persons. It would be foolish to underestimate the effects such an education program can have on the industrial growth of the State.

The Central Reference Service and the Extension agent program in Missouri are being of special aid to our mining industry. We now have 62 mines in Missouri. While some are modernizing rapidly, others have been rather slow in adopting new technological ideas and developments. I believe that with the aid of industrial extension agents who are knowledgeable in the field of mining and with the added support of a system of complete information on all technical developments which can aid mining, this industry in Missouri can make great gains.

This type of program is what the Technical Services Act is all about. It provides a source of good information to enable the local business or industry to improve itself. This kind of program is of great value to our economy. It should be continued.

I would like to make one final observation. When this Act was being discussed three years ago, it was my impression that management services as well as tech-

nical services could be provided under the Act. However, I regret to note that so far no management services have been included in the State Technical Services Program. I therefore suggest that the Commerce Department be instructed to allow worthwhile projects to transfer the latest management techniques as well as the latest engineering and scientific techniques.

Mr. Chairman, I appreciate this opportunity to present my views and I want to commend you and your committee on your outstanding work in behalf of economic prosperity in the United States.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, D.C., May 3, 1968.

HON. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: I am in strong support of S. 3245 which would amend the State Technical Services Act of 1965. The original legislation was well conceived and does not require substantive alteration at this time. An extension of two years is necessary in order to permit acquisition of additional experience and a more adequate assessment of strategies for technological transfer.

The Commerce Committee will obtain a thorough report describing the status of the program from other sources; I won't attempt to use this letter for that purpose. Significant progress has been made including the organization and staffing of new programs within each state, the appropriation of matching funds by state legislatures, and the working out of countless numbers of administrative and policy problems associated with a major departure from traditional government routines. It does not come as a surprise that many of the recently established state agencies are just beginning to become productive and that the greatest success has been demonstrated by those few states which made prior commitments to the provision of technical services. In view of these "birth pains," which are to be expected, and the modest Federal funding to date, it is impressive that most states and designated agencies have maintained a high degree of enthusiasm and have been laying the groundwork for a much larger scale of effort. The most significant evidence that the state technical services program has the potential for meeting important needs is its eager acceptance *at the state and local level* and the readiness of states to set aside scarce resources to fund the program, frequently exceeding substantially the minimum contribution required under the act.

In my opinion, the state technical services program is an essential element in a much larger mosaic of economic and social progress. We know that technical change ranks with improved education and favorable social environment in determining the quality of life attainable by future generations. But there is no simple formula, no neat theory, to describe how technological change can be made to flourish and be harnessed to the needs of society in the years ahead. This is the challenge we face. The State Technical Services Act does provide a bright opportunity to try new approaches to technological transfer which, if successful, and widely implemented, could become a major source of innovation and economic growth. I fully expect many of the efforts made by the states will prove to be of marginal value; when experiments are attempted failures often outnumber successes. However, the benefit accruing from successful experiments will far exceed the total cost of the program.

One of the reasons I am optimistic about the program's future is the preliminary evidence that a new and productive link is being formed between small and medium sized industrial firms and universities. It is unfortunate that few faculty members, particularly in the engineering schools, get a real taste of entrepreneurial activity, and that college students have no direct access to this world and seldom consider opportunities for careers in small, technologically-oriented businesses. Under the OSTTS program, faculty members have been involved in the examination of the needs of local industries, the conduct of seminars for industrial personnel and the counseling of individual firms. This is a development which must be encouraged. In a letter to you dated March 1965, I stated that both industry and universities would benefit from the resulting interchange of ideas and information. I see this even more clearly today and would add that the program may as well facilitate the movement of people between industry and university and that this may be one of the keys to rapid technological transfer.

I hope that the Commerce Committee will strongly encourage the Department of Commerce and participating state agencies to be boldly experimental in their

approach. Much more aggressive use could be made of the twenty percent of appropriations which is available under the legislation for special merit projects. In the future, we should attempt to define alternative strategies to accelerating technological progress and then try them out on a scale large enough to provide a fair test.

Sincerely,

DONALD F. HORNIG, *Director.*

[S. 3245, 90th Cong., second sess.]

A BILL To extend for an additional two years the authorization of appropriations under the State Technical Services Act of 1965.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 10 of the State Technical Services Act of 1965 (15 U.S.C. 1360; 79 Stat. 682) is amended by striking the period at the end of subsection (a) and inserting the following: “; \$7,000,000 for the fiscal year ending June 30, 1969; \$10,000,000 for the fiscal year ending June 30, 1970,” and \$10,000,000 for the fiscal year ending June 30, 1971.

Senator SCOTT. The first witness is Dr. John F. Kincaid, the Assistant Secretary for Science and Technology with the Department of Commerce.

Dr. Kincaid, the committee welcomes you here.

Mr. Philip K. Reily, Director of the Office of State Technical Services of the Department, is also here with Dr. Kincaid. And you also have a statement.

Dr. KINCAID. Mr. Ellert, Assistant General Counsel, is also here.

Senator SCOTT. Welcome also.

Go right ahead, Dr. Kincaid.

STATEMENT OF DR. JOHN F. KINCAID, ASSISTANT SECRETARY FOR SCIENCE AND TECHNOLOGY, DEPARTMENT OF COMMERCE, ACCOMPANIED BY PHILIP K. REILY, DIRECTOR, OFFICE OF STATE TECHNICAL SERVICES, AND ROBERT ELLERT, ASSISTANT GENERAL COUNSEL FOR SCIENCE AND TECHNOLOGY

Dr. KINCAID. Thank you very much. I am delighted to be here today. I joined the Department of Commerce in September and one of the things I particularly enjoyed is my contacts with State Technical Services activities.

Mr. Chairman and members, as the Senate Committee on Commerce opens hearings this morning on S. 3245, a bill to extend the authorization of appropriations for the State Technical Services Act, I would like to commend this new program to your most favorable consideration.

The State Technical Services Act, Public Law 89-182, was signed by President Johnson on September 14, 1965. It provides for Federal grants to match State funds in a cooperative program to apply the findings of science in business, commerce, and industry to encourage economic growth of the States and the entire Nation. The keystone of the legislation is local leadership, local initiative, local participation, and local resources.

And I might say parenthetically in addition to what is in my prepared statement that there are many examples which I can cite of very effective things that the Technical Services people have done. But one thing, perhaps somewhat intangible, that they have done is to make the States more aware of their responsibility for encouraging economic growth.

The Office of State Technical Services was established in the Department of Commerce on November 19, 1965, and State participation was formally invited at that time.

The first step which a State takes to participate is the Governor's designation of an agency to administer the program; the State may then request a planning grant of up to \$25,000. This has been principally a land-grant university, but not always. Every State, plus Puerto Rico, Guam, the Virgin Islands, and the District of Columbia has done this.

The second step is the submission of a 5-year plan for economic development of the State and a 1-year program, with matching funds, to begin to carry out that plan. So far in the current fiscal year, we have requests for 47 such annual program grants. Next year, we expect requests for annual program grants from all 54 of the States and other eligible jurisdictions.

The act also permits matching grants to qualified institutions for programs that are especially meritorious or which have specific regional or national significance. We have made 26 matching grants for such programs in our work to date.

Finally, the act calls for assistance to the States by provision of referral services, and we have established a capable activity for this purpose.

It has been estimated that postwar expenditures for research and development of \$160 billion have created a vast reservoir of technology, much of which was largely unused in the Nation's economy and which would be of immediate practical value to American enterprise if made available when and where needed.

Conventional document services and other impersonal techniques have tended to swamp the user in his search for a specific answer. By contrast, the State technical services program is designed to utilize our technical colleges and others to interpret technology in terms of specific needs, to place specific results in the hands of the businessman, and to offer him referral services and seminars which are directly applicable to his work. It takes this sort of face-to-face contact to bridge the gap between research and innovation.

And this is being done in State after State. The list we keep of examples of practical transfers of technology to business continues to grow impressively.

Mr. Reily, on my left, has assembled this in a document which I will be glad to make available to the committee if you would like to have it.

Senator SCOTT. It may be included in the record.
(The document follows:)

EXAMPLES OF TECHNICAL SERVICE ACTIVITIES

In Pennsylvania, a knitting-machine manufacturer was getting reports from all over the world of failure of a critical surface-hardened cam. Machines were down and costs were up, and nobody knew what was wrong. A State Technical Services man from Penn State showed them that the chromium-containing steel they had selected formed a thin surface film which resisted the nitriding process used for surface hardening. Prior scouring produced a reliable cam.

Brooklyn Polytechnic Institute—prior to State Technical Services support—had to charge so much for short courses that they were practically limited to large companies in the Defense and NASA advanced-technology complex on Long Island. Recent short courses under our partial sponsorship now attract small

companies too. Selected students were permitted to attend one short course on the metallurgical aspects of electric-power transmission and gain by association with practicing engineers. The course had been developed in close consultation with International Nickel Company, American Electric Power Company, and others, to insure its aptness.

A manufacturer of parts for the automotive, tractor, and power-equipment industries met with a Michigan State Technical Services field engineer and described a problem in making prompt response to requests for quotation. A consulting arrangement was worked out with a University of Michigan faculty member under which graduate engineering students will assist in the preparation of quotes.

A State Technical Services field man from Georgia Tech assisted a maker of tire-retreading equipment in converting to fiberglass insulation for improved curing at reduced costs.

A North Carolina raiser of fryers and broilers was losing his feather-pillow business to synthetic fibers because of an odor problem. A State Technical Services field man from North Carolina State introduced a deodorizing process which permitted him to meet Army specifications and win a \$300,000 pillow contract as low bidder.

The Referral Network Office of the State Technical Services program at Ohio State was actually instrumental in arranging a merger of three companies on which an engineer had called independently. One of the companies was an able manufacturer with an effective research arm but lacked both engineering-development talent and working capital. A second had good development-engineering capabilities but also lacked working capital. The third company had an excellent working-capital position and a strong marketing group but was searching for new product lines. The merger took place within three months of the State Technical Services engineer's suggestion, and the combined companies now occupy a single building and employment has doubled.

In New York, a partner in an architectural-engineering firm had access to a shared-time computer but was unable to use it until he completed a three-day course sponsored by the State Technical Services program at Rensselaer Polytechnic Institute. After the course—which included actual time at a computer console for every registrant—he has used the firm's computer extensively. One frequently performed calculation which had been taking him up to four hours to complete can now be done in nine minutes.

A Pennsylvania youngster home on leave from a Peace Corps assignment in Africa wanted to take back blueprints of a good windmill—one that would pump water efficiently and not blow over in a high wind. The PennTap State Technical Services activity had to search but finally found a set for him.

In New York, a geologist at St. Lawrence University, working under the State Technical Services Program, showed a ready-mix concrete company how to quarry and cut a local stone during its four-month winter shut-down. They cut 2,500 tons of stone the first year.

The State Technical Services Referral Network Office at Cleveland State University worked out an agreement with Westinghouse under which Ohio companies can have limited experiments performed on a major laser facility.

In Oklahoma, a State Technical Services man was able to bring together the owner of a large inventory of old pin-ball machines and a manufacturer of flight-training devices who could use the switches, etc., to the profit of both.

A State Technical Services field engineer and a member of the Physics Department faculty at Eastern Michigan University showed a small electromechanical-products manufacturer a way to measure nondestructively the thickness of silver electroplating.

A small Utah concrete-aggregate firm has a line of marble-finished window sills, counter tops, etc., which were subject to bowing and warping in the longer items with no successful remedy. A civil-engineering professor/consultant—recommended by the State Technical Services program there—traced the problem to the actual aggregate used and suggested an effective solution.

A Michigan automotive parts manufacturer described a problem to a State Technical Services field engineer from Wayne State University: a fifty percent rejection rate on a windshield-wiper control system was traced to a breakdown of the lubrication/sealing material. The engineer arranged for a plant visit by a faculty member of the University of Michigan who suggested an improved lubrication method and a design change which substantially reduced the rejection rate.

In Washington, a State Technical Services demonstration—conducted jointly with the College of Fisheries at the University of Washington and the State

Department of Agriculture—of the use of irradiation in processing of fish and agricultural products caused one of the largest wheat ranchers in the State to experiment with irradiated seeds. Early results were so effective that he is now planning an experiment involving 900 acres.

A Pennsylvania company used magnetic shoes on a conveyor belt to pick up parts from an annealing oven. A new part—annealed at a higher temperature—frequently fell off the magnets, and company personnel ascribed the problem to loss of magnetic permeability at the higher temperature and planned to institute an expensive quick-cooling step. A State Technical Services man pointed out that permeability was unaffected by additional heat in that temperature range and that the new process would not solve the problem. (Probably the new pieces were heavier.)

An Ohio company needed a short method of determining bacteria counts in a lubricating coolant—extensive efforts of their own had failed to shorten the analysis from 48 hours. The State Technical Services Referral Network Office at Cleveland State University recommended a consulting biochemist who provided a method which can be completed in 8 hours.

A State Technical Services field engineer from Georgia Tech assisted a manufacturer of hydrocyclones (for separating sand and gravel) in the development of a liner to replace rubber liners, which last about a year on metal ones which last a week. After a literature search, metallurgical consultation, and advice from the Engineering Experiment Station, some design changes were made. The new polyurethane liner has been in use more than a year with no apparent wear.

A small manufacturer of vacuum-formed and thermoplastic parts obtained assistance from a State Technical Services man and a member of the Chemistry Department faculty at Eastern Michigan University in selecting instruments and techniques for quality control of raw materials.

A Georgia manufacturer of hubs for computer and video-tape reels used an acid cleaner for its castings, and acid fumes and splashes were damaging to facilities. Planning a move to a new building, the company requested State Technical Services assistance in plant design. Referral was made to another Georgia company which formulated a special protective coating for their use.

Three Illinois construction companies participated jointly in a State Technical Services project using a time-shared computer. One of the companies estimated savings up to \$60,000 in direct-labor costs alone during the first year. Starting in January, the project was expanded to serve 16 companies from a single direct-access computer with potential annual savings approaching \$5 million.

A Michigan tool-and-die manufacturer asked the State Technical Services field engineer at Ferris State College for assistance in butt-welding stainless-steel sheets to permit him to produce an item at lower cost than outside purchase. Together with the NASA Technology Utilization Center at Wayne State University, the field engineer assembled applicable technical information and located a metallurgical consultant at Ferris State. The company not only learned to make the butt-welded product but is now planning to broaden its product line as a result.

West Virginia has a large number of small manufacturers who spray paint their products. Spray painting has been an inefficient operation as up to 50 percent of the paint is wasted and rejects often occur. The Applied Technology Center of West Virginia University, with STS support, is encouraging the use of an electrostatic paint process based on unlike charges of electricity causing the paint to adhere quickly and evenly. This process has great advantage as the front and back of the workpiece can be painted at the same time and with practically no paint loss. With paint equipment contributed by a manufacturer, West Virginia University is demonstrating this up-to-date method to manufacturers. Savings in paint, labor, equipment, rejects, floor space, and maintenance are being realized.

Community Television of Southern California, KCET, channel 28, Los Angeles, produced and presented a series of one-hour programs under the title R&D Review. An additional series of half-hour programs entitled "Innovations" has been approved. The use of educational television as a method of disseminating technical information to industry is in itself an innovation in communication. In addition to being shown on educational television stations in California, these programs are being shown on stations in 20 other States and the District of Columbia through the "Bonus circulation" of National Educational Television Network. Although only 22 percent of the R&D Review telecasts and 15 percent of the Innovations telecasts had been aired up to January 1, 1968, a total of 221 mail and telephone referrals had been serviced.

In Georgia, a new type of compressed brick composed of sand rather than clay was introduced through the STS program. This is a wholly new product with only one other plant in operation in North America. A faculty member of the School of Ceramic Engineering worked closely with this company. In a similar fashion, new developments in the use of plastics instead of clay for bricks have been furnished to the brick industry in Georgia.

A Florida company interested in manufacturing light weight aggregate for construction blocks was provided technical assistance through the STS program at the University of Florida. A search of the available technical literature and other determinations showed that a commercial product could be made only by closely controlling raw material compositions and firing schedules. The company is now planning the establishment of a pilot plant based on the technical information provided to them.

A medium-sized Michigan manufacturer of die-cast auto parts was experiencing a high rate of early failure of his dies and was uncertain of the efficacy and economic return of a proposed hardening process. The State Technical Services director at Eastern Michigan University searched the file of a NASA Regional Dissemination Center and discovered proof that the process would be effective. With this reassurance, the company adopted the die-hardening process and achieved a substantial cost reduction.

A Utah rendering plant manager, visited by a State Technical Services field engineer, requested information on the treatment of effluents from his plant. He was so impressed with the utility of new technology of aerobic and anaerobic biological processes that he submitted two further requests for information and subscribed to the Utah Technology Announcement Service. (Then he revealed that he had been an early critic of State Technical Services as "one more Federal program.")

An Ohio instrument company had estimated the time needed to upgrade an obsolescent product as almost a year, an effort which it could not afford. State Technical Services personnel at Ohio State arranged assistance from several semiconductor manufacturers which enabled the company to "leapfrog" into the latest technology of integrated circuits. Redesign was accomplished in less than three months with increased performance and reliability and a \$4 reduction in the cost of materials.

A Georgia manufacturer of plastic pipe had redesigned his production line and contemplated a major change in the cooling step—a shift from cascade cooling to submerged cooling in high-flow-rate troughs. However, he was insufficiently confident of his work to make the needed investment until a State Technical Services field engineer restudied the design and concurred in it. When the cooling step was then changed, it improved his product considerably.

A small North Carolina manufacturer of aluminum chairs had stopped production of his best seller because concern had been expressed over its strength and design. A State Technical Services field engineer calculated forces on all components and showed that the chair was thoroughly safe. The company resumed production at a rate of 30,000 chairs per year.

A Utah printing firm used the State Technical Services information system to get technical information on printing on metals. On the basis of the information received, the company entered a new business and is already selling signs, markers, and nameplates produced by the new process.

Under the New York State Technical Services program, Rensselaer Polytechnic Institute conducted a workshop on computer methods for engineering analysis and design which was planned to meet the needs of small organizations and practicing engineers without access to powerful computers or prior experience in computer work. Actual practice was offered each participant on remote time-sharing computer terminals. Both the first workshop and a repeat session were oversubscribed, and a third session is being planned. One engineer returned to his company and wrote a computer program for conducting in four seconds a common computation which had routinely taken four to six hours in the past.

The Raleigh, N.C., works of a major chemical company consulted the State Technical Services program for advice on disposal of a waste liquor containing about one-fifth sulfuric acid and traces of nitric acid and other materials. Economy and pollution control were both achieved by the suggestion that the waste be neutralized with ammonia to produce an ammonium sulfate-nitrate fertilizer—the other materials were determined to be harmless to crops.

A large Michigan manufacturer of specialized auto parts consulted the State Technical Services director at Eastern Michigan University on a problem of high costs on two machining operations. Referral was made to a faculty industrial

engineer who recommended use of numerical control on the machines. When the machines were retro-fitted in accordance with his recommendation, cost savings were achieved which the company estimates at several thousand dollars per year.

A Utah manufacturer of submersible pumps had, for years, tolerated as unavoidable some problems associated with porosity of purchased aluminum housings—water seepage, pump failures, expensive replacements, and customer-relations problems. A State Technical Services field engineer suggested several impregnants and sources of expert advice on their use. As a result, the company adopted such an impregnation step and totally eliminated the failures.

A large North Carolina manufacturer of synthetic fibers requested State Technical Services assistance in installation and certification of cobalt reactors; commercial firms which they had contacted were unfamiliar with their equipment. Referral was made to the Nuclear Engineering Department at North Carolina State University which supplied the needed assistance.

In the course of their routine contacts with Ohio industry, Referral Service Network engineers were repeatedly advised on the need for a specialized course in engineering management. On their recommendation, a week-long course on the subject was arranged. It was given in December with such good response that it was repeated in January and again in April.

A polyurethane material adopted as a liner for hydrocyclones (for separating sand and gravel) on the recommendation of a Georgia State Technical Services field engineer was so successful in extending the life of the machines that it was later applied to the mixing blades inside ready-mix concrete trucks with a marked reduction in frequency of expensive replacement efforts.

A manufacturer of tents and sleeping bags experienced frequent failure of sewn joints in nylon-reinforced vinyl sheet. A Utah State Technical Services field engineer conducted a literature search and identified references on which the company based a decision to replace the sewn joints by a chemical bond which is holding up well.

As a final check on technical feasibility, the R&D section of an Ohio company requested State Technical Service assistance in review of a project to develop highly specialized instrumentation. The Referral Service Network Office at Ohio State located a consultant who showed the company in an hour that their approach was not practical and that the substantial investment they were contemplating would be wasted.

Dr. KINCAID. If I were to single out for comment one aspect of the State Technical Services program, it would be the interest and effectiveness of our university community in taking the program to the working businessman.

When the President signed the State Technical Services Act, he said, "The vehicles for success will be 250 colleges and technical schools throughout the land." And right now, less than 3 years later, nearly 200 universities are actively involved with others planning early participation.

I have heard it said that the university does not reward community-service activity as it does teaching and research, but I cannot accept this as true after seeing the dedication of universities and their faculties to this work. I understand that President Toll of the State University of New York at Stony Brook equates in importance teaching, research, and community service as faculty responsibilities, and I am convinced that this is a widespread philosophy. Indeed, Vice President Ratchford of the University of Missouri, who will testify later today, has written the Under Secretary of Commerce that, "The basic mission of these institutions—land-grant colleges and State universities—includes conducting such activities that enhance the economic development of their respective States."

I personally welcome the universities to this vital new teamwork with State and Federal Government and I believe that their mobilization for this task has been the most important achievement of the State Technical Services program in its brief history.

Senator Magnuson introduced the State Technical Services Act in the 89th Congress with the expectation that it would raise the level of science and technology in American business. His expectation is being fulfilled. But this is just a beginning. Much scientific knowledge remains untapped, and many businesses have unfilled—indeed, often unrecognized—needs for it. Our efforts must be sustained and enlarged.

The Department of Commerce therefore earnestly requests the continued support of the Congress in carrying on this work.

Thank you, Mr. Chairman and members, for this opportunity to endorse the State Technical Services Act. I would like now to introduce Mr. Philip Reily, Director of the Office of State Technical Services, who will tell you more about our program.

Senator SCOTT. Thank you, sir.

Go right ahead, Mr. Reily.

Mr. REILY. Mr. Chairman, it is a very high privilege for me to appear with you today and describe to you some of our early work and progress under the State Technical Services Act of 1965. Although I'm very new in the job as Director, I have had a long-standing interest in the act and, as the new Director of the office which it established, it is a great privilege for me to be able to assist you in your deliberations on its first extension.

PURPOSE OF THE ACT

The State Technical Services Act has a high purpose, as you mentioned—"To promote and encourage economic growth by supporting State and interstate programs to place the findings of science usefully in the hands of American enterprise." Although it has been less than 3 years since the President signed the act on September 14, 1965, and barely 2 years since the first full-time Director was appointed, I am confident that the committee will find evidence that this purpose has already been served.

ASSESSMENT

We can assess the program today in terms of acceptance by the States, particularly by their legislatures which must appropriate part of the matching base, by State universities which must contribute technical talent and university funds, and by individual and corporate citizens of the States whose user fees are now accounting for nearly one-third of the non-Federal support.

Evidence of this acceptance is shown by the services and benefits that already have been provided to business, commerce, and industry. More than 1,500 technical service projects involving technical information and referral services, field services, and educational programs—all designed to update the skills and knowledge of the participants—are being conducted by more than 200 educational institutions and nonprofit organizations all across the Nation. But in addition to providing assistance in a wide range of technologies, numerous States have developed programs to serve the technological needs of their principal businesses and industries. Industries such as construction, ceramics, fishing, food processing, forestry, metalworking, mining, petroleum, printing and graphic arts, stone, textiles, and woodworking are all being helped in this way. These local programs, tailored to meet the recognized needs of principal industries in their States, have been made possible through the enactment of this legislation.

In addition, I think it is important to take into account the level of quality and enthusiasm of the people who have been attracted to work in this program. As I have visited the States—and I have tried to visit as many as I could in my short time here—and met their officials in my office, I have been continually impressed by the stature, the ability, and the dedication of the people actually doing this work.

Finally, reflecting on the importance which Americans attach to this new program, is the stature and hard work of the advisory councils—required of each designated State agency under the law—in which 761 leaders in business, labor, technology, education, and local government meet regularly to guide the State programs. In short, I have never seen so much ability and enthusiasm per dollar appropriated in any major program.

STATE PARTICIPATION

Speaking of acceptance by the States, I would like to reiterate Dr. Kincaid's observation that all 50 States plus Guam, Puerto Rico, the Virgin Islands, and the District of Columbia have designated agencies and begun planning. Twenty-four submitted plans with matching funds in the very first year, and 47 are participating at present. Next fiscal year, we expect participation by every State and territory.

Another favorable indication of acceptance of the State technical services program is a clear trend by the States to build their programs faster than dollar-for-dollar matching will permit. In an informal survey for fiscal year 1967, we determined that more than \$1.15 in non-Federal funds went into the program for every Federal dollar and about \$1.35 in 11 States where this trend is significant.

Still another measure of acceptance is a markedly increasing proportion of user fees in the non-Federal share of total costs. These are fees actually paid by companies and individuals who use some of the services made possible through the passage of this act.

There are four sources of non-Federal support: State appropriations, institutional funds, user fees, and contributions of services and property. In the 3 years of our program, user fees have accounted for more and more of the non-Federal share—about 6 percent in the first year and nearly one-third in the current year. I think this is the soundest possible evidence of the acceptance of this new program by American industry and commerce. Together with the trend to overmatching in the States, this increasing user contribution places a double leverage on the Federal dollar.

Senator SCOTT. If I may interpolate, may I say that the Federal dollar needs all the leverage it can get.

Go ahead.

Mr. REILY. Yes, sir.

We are permitted, as you know, to grant matching funds for technical service programs of special merit that have broad regional or national significance or employ new techniques not included in State programs. We have used special merit programs to strengthen and support the State technical services program at the State level, and we have put emphasis upon programs which will become self-supporting.

Exemplary of a special-merit grant is a regional project at the University of Wisconsin for bringing new ideas to industry by means

of a mobile laboratory. Topics of interest to the audience are selected from about 20 developments at the University of Wisconsin. During the summer and fall of 1967, the laboratory—staffed by University of Wisconsin teachers and researchers—traveled over 5,000 miles and presented 44 1-hour demonstrations to some 825 managers, engineers, technicians, educators, and students. In addition to Wisconsin industry, the mobile laboratory made trips to five neighboring States—Iowa, Illinois, Indiana, Ohio, and Michigan.

The State Technical Services Act authorizes allocation of 20 percent of our total appropriation for special-merit programs. However, due to the demands of State programs for the limited funds available thus far, we have restricted our special-merit programs to less than 10 percent.

REFERRAL SERVICES

The State Technical Services Act provides for referral services to assist and guide the States in the development and operation of the most effective referral and information services, taking into consideration those functions that can be best performed at State, regional, and national levels.

One of our major objectives is to provide a quick-switching referral service to all major sources of scientific and technical information through a single contact point in each State or region. Significant progress is under way through a regional pilot program in the southeastern area of the United States in conjunction with the National Referral Center for Science and Technology.

A second major objective is to assist State program personnel in their referral activities through regional technology-transfer seminars where they may learn of the most effective ways of dealing with the complex function of technology transfer. The first such seminar is scheduled this summer. While primary emphasis is on the techniques of—and barriers to—technology transfer, information-technology developments such as elements of system design and operation are also included.

Since the State programs together will represent a major national effort in technology transfer, the third of our major objectives is to reflect the requirements of this effort and the lessons we learned as an important contribution to planning for a national information system.

INTERAGENCY COOPERATION

The State technical services program deals with scientific and technical information generated by others and operates through direct cooperation with all Federal, regional, and State technology and information resources. Through this large, decentralized system of participating institutions, the program is in a unique position to detect and eliminate duplication of effort.

Accordingly, we have initiated cooperative arrangements with other Federal agencies which include the National Aeronautics and Space Administration, the Department of Defense, the Atomic Energy Commission, the National Referral Center for Science and Technology, the Science Information Exchange, the Small Business Administration, the National Science Foundation, and the Department of the Interior.

REGIONAL PROGRAMS

In less than 2 years since the beginning of projects under the act, 14 States—one-quarter of the States and eligible territories—are already participating in formal regional technical service activities. The six New England States have formed the New England Technical Services Board, and their first regional program is just about to be funded by our office. The seven Rocky Mountain States and Nevada have established a State Technical Services Council of the Federation of Rocky Mountain States, and they have a regional program in preparation. And there have been eight special merit programs of regional significance.

Our Public Evaluation Committee, under Chairman Elliott, in its recommendations to the Secretary of Commerce, has urged us to encourage such regional programs. We concur completely in this recommendation and are doing all that we can to speed this trend and to help, where possible, in achieving the hard compromises and effective organizations which are necessary for regional cooperation.

APPROPRIATION AND ALLOCATION OF FUNDS

The State Technical Services Act authorized appropriations of \$10 million, \$20 million, and \$30 million in fiscal years 1966, 1967, and 1968, respectively, and the States of course planned their programs on this basis. Actual appropriations, reflecting national priorities abroad, were \$3.5 million, \$5.5 million, and \$6.5 million in those years, so that barely one-quarter of the authorized appropriations were actually made. Many of our able State officials and the fine people working in this program will of course determine their future participation by the Congress action on this extension, and speaking for them, I certainly hope that they will be encouraged.

Of the \$15.5 million appropriated in fiscal years 1966 through 1968, \$13.9 million or 90 percent was returned to the States, as follows:

	Amount	Percent
Matched program grants.....	\$9,700,000	63
Matched special grants.....	1,200,000	8
Planning grants.....	3,000,000	19
Total.....	13,900,000	90

The balance was divided between referral services to the States (\$0.8 million or 5.3 percent) and administration of our Washington office (\$0.7 million or 4.5 percent).

I might add that the act authorizes 5 percent of the appropriations for administration.

Demand for Federal matching funds has exceeded the supply in each year. This year, for example, even though State officials well know that our appropriation is barely one-fifth of the amount authorized, we have received requests—actually backed by State matching funds—for \$6.2 million, 41 percent more than the amount we could allocate to match State program funds.

We are now asking for a 2-year extension of authorization of appropriations. In fiscal year 1969, in recognition of current national

austerity, our authorization request and budgetary plans are based on an intention just to sustain the life of the State technical services program for 1 more year.

Looking ahead to fiscal year 1970 in the hope that important domestic programs such as this may begin to develop, our regional program officers have estimated the level of State program activity for which the individual States will be able to generate matching support, as follows:

<i>Fiscal year 1970 State funds to be matched</i>		<i>Millions</i>
Region:		
Northeastern.....		\$2. 89
Southern.....		3. 19
Midwestern.....		4. 65
Western.....		3. 00
Total.....		13. 73

A total of \$13.73 million is anticipated as available from the States to match our Federal dollar.

We now have 2 years of work behind us in this new program and are well into the third with the fourth planned for in detail. Of the 48 States expected to have technical service programs in operation by the end of fiscal year 1968, 23 will have 3 or more years of experience in such work; 18 will have 2 years of experience; seven States will be starting new programs.

In the course of our work with the States—which includes 54 State plans and approaches 113 State program years—we have gained a large and growing fund of knowledge of what works and what doesn't work, of what inviting avenues of approach are really disappointing blind alleys, and of what the true cost of programs will be.

We are at the center of a brandnew, thoroughly decentralized, and capably staffed national program, and we have learned a lot in a very short time. This new knowledge is tremendously valuable to the States and to developing regional activities. In fact, it is the foundation for the sort of counsel and guidance which the States expect from Washington as they build programs based primarily on their own resources and assessments of their own strengths and weaknesses.

For example, we have seen the effectiveness of field service activities undertaken in North Carolina, Georgia, Michigan, Ohio, and other States and are encouraging the establishment of similar activities where they promise equal success but have not been considered. As a result, in the 3 years of our work, the number of States with field service programs has climbed from 12 to 35.

In the long run, I see the principal role of the Office of State Technical Services as, not a granting function, but one of teamwork with the States to assure that every State gains from the experience of every other State, and that the latest ideas and techniques for technology transfer are put to work promptly and cooperatively.

Thank you, Mr. Chairman and members of the committee. My associates and I will be glad to answer your questions and furnish additional information.

Senator SCOTT. Thank you, Mr. Reily. And at this point I have a couple of questions before we go further. I would like to congratulate the Department on establishing the kind of program which fits so well into the State-Federal partnership theory, the cooperation which you have elicited and supplied. It is an excellent example and a good guideline, I think, for Federal and State agencies everywhere.

As you know, I have a further interest in the program as a member, along with my colleague, Senator Clark, of the State planning board, and I would like to ask these two questions.

You have indicated that the Office of State Technical Services anticipates a level of interest in activity by the States that would justify by fiscal year 1970 the total Federal matching in the amount of 13 $\frac{1}{10}$ million. Would you favor an amendment to this bill? It is perfectly all right with me if any of you gentlemen answer these questions. Would you favor an amendment to this bill specifying that amount, rather than the open ended authorizations as currently drafted?

Mr. REILY. That amount, Mr. Chairman, represents the estimate of funds in the States to match the Federal dollar. This in itself would not constitute the complete fiscal structure of the program, in that an equal amount of Federal dollars would be just one aspect. We have our referral services program to sustain. And we have our special-merit program, authorized at 20 percent of total appropriations, to sustain. And, of course, we have our Washington office, authorized at 5 percent, to sustain.

So it would take a little arithmetic and an estimate of referral service activities at that point to develop a budgetary figure from this estimate.

With respect to your question—and I think I speak for the States in saying this—my concern is not for the immediate level of appropriation. We all know that our country faces many priorities and understand, of course, the place in which our program fits in the appropriation process.

My concern—and speaking for the very fine people in the States—is that we don't reach into the future and place a ceiling on the program. I would like, via the authorization process, to see encouragement. Then when fiscal year 1970 comes into the appropriation phase, if austerity still prevails, of course all of our people will understand this.

My concern, then, is for an expression of continued interest, which would be reflected best, of course, in the authorization for fiscal 1970.

Senator SCOTT. In other words, you contemplate—as this committee has indicated by its action—that it certainly contemplates an ongoing and, hopefully, ultimately a stronger Federal and State commitment to this general program.

Mr. REILY. Yes, sir; we certainly do.

Senator SCOTT. I think it is a good place here to comment that there has been a completely honest approach to this program as a permanent program. We all know there is a saying in Washington that "Nothing is more permanent than a Federal temporary program."

And I am glad we avoided the original hypocrisy of indicating a temporary program or trying to get our nose under the tent with the standard \$10 million approach, and so on. I remember that we did that with the National Institutes of Health, for example, and other vast programs here.

But this was intended from the beginning to be a permanent program, and to be an ongoing one. It was recognized that it will ultimately cost more money, because obviously as population increases services increase. The State and Federal Government are becoming more aware of the need for planning and for the exchange of highly valuable technical information.

And if expertise tends to grow to the Federal Government, then it seems to me it is the executive and legislative responsibility to find a way to redistribute and rediversify these skills so that they are not ultimately lost to the States by a process of centralization.

My second question is this. Since one of the purposes of this hearing is to enable this committee to find out to what extent the State and Technical Services Act, as it is now being administered by the Department, is funding programs of business management or other programs not involving the direct transfer of scientific and engineering information, may I inquire whether this controversy has been resolved, and if so, how?

Mr. REILY. This has been a question almost from the first consideration of a grant application. And we have debated within our own office and searched the legislative history to determine the intent of Congress with respect to the management science aspect of the program.

Recently we developed an opinion of the General Counsel of the Department of Commerce which has been our guideline, and we have with us here at the table this morning Counselor Ellert, who is an Associate General Counsel in the Department of Commerce for Science and Technology, who is the author of the opinion which guides our work at this time.

With the Chair's permission I would like to ask Mr. Ellert to address himself to this.

Senator SCOTT. Yes, would you, Mr. Ellert, please?

Mr. ELLERT. Yes; I would be very pleased, sir.

Actually, as Mr. Reily said, this has been a problem almost from the start of the act. We have written a legal opinion, which I would be happy to submit for the record, which will explain our reasoning.

Senator SCOTT. We would be very glad to include that.

(The legal opinion referred to follows:)

U.S. DEPARTMENT OF COMMERCE,
OFFICE OF THE SECRETARY,
November 17, 1967.

To: Dr. John F. Kincaid, Assistant Secretary for Science and Technology.
From: Robert B. Ellert, Assistant General Counsel for Science and Technology.
Subject: Legal opinion on the scope of the State Technical Services Act.

This is in response to a request by Acting Under Secretary Hollomon (tab A) that I review (a) the State Technical Services Act of 1965 (79 Stat. 679, 15 U.S.C. 1351), (b) its legislative history (Hearings on S. 949 and S. 2083 Before the Senate Committee on Commerce, 89th Cong., 1st Sess. (1965); Senate Report No. 421; Hearings on H.R. 3420 Before the Subcommittee on Commerce and Finance of the House Committee on Interstate and Foreign Commerce, 89th Cong., 1st Sess. (1965); House Report No. 817), (c) the General Regulations Governing Operation and Administration of the Act (15 CFR, Part 700), and (d) a legal opinion on the scope of the Act prepared by Attorney Daniel J. Manelli, for the purpose of determining:

(1) Whether, as a matter of law, the term "technical services" as defined in the State Technical Services Act must be limited to the physical sciences and the related technologies, as Mr. Manelli's memorandum has been interpreted to suggest; and

(2) How far the regulations either permit or may be modified to permit support of technical services for business management practices.

A copy of Mr. Manelli's opinion is attached (tab B).

I.

The term "technical services" is defined in both the Act (15 U.S.C. 1352(a)) and the General Regulations (15 CFR 700.2(d)) as follows:

"Technical services" means activities or programs designed to enable businesses, commerce, and industrial establishments to acquire and use scientific and engineering information more effectively through such means as—

(1) preparing and disseminating technical reports, abstracts, computer tapes, microfilm, reviews, and similar scientific or engineering information, including the establishment of State or interstate technical information centers for this purpose;

(2) providing a reference service to identify sources of engineering and other scientific expertise; and

(3) sponsoring industrial workshops, seminars, training programs, extension courses, demonstrations, and field visits designed to encourage the more effective application of scientific and engineering information.

Ordinarily, the addition of three illustrative activities under the preface "through such means as" would not be construed to modify or enlarge the scope of the preceding definition. In this particular case, however, it is noted that the third illustration refers to activities "designed to encourage the more effective application of scientific and engineering information." Since the verb "to encourage" is not encompassed by the verb "to enable", a broad interpretation of the statutory definition permits the recognition of three general types of "technical services" activities, i.e., those designed—

(1) to enable businesses, commerce, and industrial establishments to acquire scientific and engineering information;

(2) to enable businesses, commerce, and industrial establishments to use scientific and engineering information more effectively; and

(3) to encourage the more effective application of scientific and engineering information by businesses, commerce, and industrial establishments.

Each of the three recognized types of "technical services" includes a specific reference to scientific and engineering information. The importance of construing the derivative word "science" in conformity with the Congressional Declaration of Purpose (15 U.S.C. 1351) has been clearly and correctly stated by Mr. Manelli. Dictionary definitions for the word science range from "knowledge" to "boxing". Neither of these meanings is consistent with the Declaration of Purpose. The selection of the single authoritative definition lying between these extremes which most closely reflects the Congressional intent necessarily involves an examination not only of the Declaration of Purpose, but of the legislative history.

It is obvious from a review of the hearings that the sciences which were uppermost in the minds of the legislators were physics and chemistry. No citations are necessary to demonstrate that these sciences, together with their engineering applications, are within the coverage of the Act. Apart from these fields, the only science which clearly appears to have been regarded as within the scope of the statute was biology (111 Cong. Rec. 17744, 22489).

During the course of the hearings, attempts were made to amend the definition of "technical services" so as to encompass accounting, finance, management, marketing and labor relations information. (House Hearings, p. 85; Senate Hearings p. 118) These proposals were not adopted and the colloquy following receipt of the proposal by the House Committee does not evidence acquiescence in the assignment of a broad interpretation to the word "science". Indeed, it appears that the converse is true: concern was expressed lest the term "technical services" be too broadly, rather than too narrowly, interpreted. (House Hearings, pp. 30, 86)

When considered in light of the Declaration of Purpose, these facts strongly suggest that the following definition was intended by the Congress:

"Science 5b. In modern use, often treated as synonymous with "Natural and Physical Science", and thus restricted to those branches of study that relate to the phenomena of the material universe and their laws, sometimes with implied exclusion of pure mathematics." (*Oxford English Dictionary*, 1933.)

Accordingly, in answer to the first question posed by Dr. Hollomon, it is my opinion that, as a matter of law, the words "scientific and engineering information", as employed in the statutory definition of "technical services", have reference to the pure natural and physical sciences and the applied natural and physical sciences, including mathematics.

In addition, it is abundantly clear from the legislative history that the Congress was addressing itself not merely to scientific information in general but to "the latest findings" of science. (111 Cong. Rec. 16732) While this limitation is not expressed in the statutory definition as a matter of law, it ought nevertheless to be recognized as a highly persuasive policy directive.

II.

Management science is not a physical or natural science. This does not mean, however, that all activities or programs related to business management practices are automatically excluded from the possibility of support under the Act. On the contrary, there are many activities in the business management field which, if approved, would be eligible for support. This fact was emphasized by Secretary Connor in his testimony before both the Senate and House Committees which considered this legislation:

"Technology can also help in business management, as well as in engineering and production. For example, a program to introduce managers to the use of computers in planning better marketing surveys or for planning their supply or distribution operation would be a very valuable service." (House hearings, p. 19; Senate hearings, p. 19).

Whether or not a particular business management program is eligible for support can be determined only by comparing the specific activity being proposed with the three criteria for support which are recognized by the Act. From a legal point of view, the question is primarily one of ascertaining whether there exists a proximate causal relationship between the business management program and one of the three effects which "technical services", by definition, must be designed to produce, i.e. (1) enable businesses, commerce, and industrial establishments to acquire scientific and engineering information, (2) enable businesses, commerce, and industrial establishments to use scientific and engineering information more effectively, or (3) encourage the more effective application of scientific and engineering information by businesses, commerce, and industrial establishments. If such a causal relationship exists, a business management program could be funded.

An examination of the STS Regulations indicates that no change is necessary to authorize the funding of business management programs or other programs not involving the direct transfer of "scientific and engineering information", provided that the proximate causal relationship discussed above is shown to exist.

Mr. ELLERT. The gist of the opinion, if I may summarize it, is that based on the legislative history of the act, and the text of the act, we came to the conclusion that the words "scientific and engineering information" have reference to the pure natural and physical sciences and the applied natural and physical sciences, including mathematics. We therefore felt that management sciences did not fall into the physical and natural sciences category. However, this did not mean that all activities or programs related to business management practices were automatically excluded from the act. Because we went on further to say that if there were a proximate causal relationship between the management science activity and, say, the encouragement of the more effective application of scientific and engineering information by business, commerce and industrial establishments, such a program element could in fact be funded.

And I might quote as an example, during fiscal year 1967, such management programs which encouraged science and technology constituted 22.8 percent of our projects, and received 15 percent of our funds.

Now, the determination of whether a particular management science does have this proximate causal relationship to the purposes of encouraging the scientific aspects of the act is a value judgment, which is made by the policy people in consultation with the legal people.

Senator SCOTT. What we are anxious to get across, I think, is that we would hope that the interpretation of the scope of the act would not be so narrowly conceived as to exclude management science programs where relevancy can be established.

Mr. ELLERT. Well, this is certainly the interpretation that we have now, sir.

Senator SCOTT. Thank you very much, Mr. Ellert.

Now, may I ask Dr. Kincaid, in your allocation of Federal funds to date, what problems have you encountered in the identification and setting of priorities? And it is, as I said, quite all right to me if anyone here of the three of you answer this question.

Dr. KINCAID. Well, one problem that Mr. Reily referred to briefly is the question of field services, and it has been our experience that perhaps the highest payoff part of the program is the field services.

And the extension is going to have an impact upon this; because, remember that if you give a short course, there is really no problem of hiring people who expect a permanent job. On the other hand, if you employ a field engineer, he doesn't want a 1-year job. He wants a permanent job. And so an extension that tends to give people the impression that the program is going to be a temporary thing isn't going to be very helpful to us.

Senator SCOTT. Have you encountered any special problems during administration of the act which you think ought to be brought to the attention of the committee, other than those indicated in your statements up to now?

Dr. KINCAID. Well, I am not sure that it is going to be in compliance with the committee, but our State programs vary a great deal. And one of the things that Mr. Reily has done since he came on board, as consultant and then director, is to go out in the field and become thoroughly acquainted with the programs and find out what makes the good ones good and the weak ones weak and try to upgrade the whole thing.

I think we are having appreciable success.

Perhaps Mr. Reily could comment on this point.

Senator SCOTT. I take it that your experience would indicate that where you have an excellent executive director within the State, someone who himself is well trained in planning, that that does ease your problem, doesn't it? And part of the problem may be personnel within the States, in other words, in that caliber.

Dr. KINCAID. Indeed it does. It is very much the stature of the head people in the States. So we feel that a stronger Federal leadership role is needed here, and is going to get it—and is getting it, in fact, already.

Senator SCOTT. I think that will be all then. The committee has no more questions.

I ought to say, Dr. Kincaid, the reason that we have a committee of one at the moment is that there is an executive session of the Commerce Committee going on in the back room. I want you to assume their spiritual presence here.

Thank you very much.

Dr. KINCAID. Thank you very much. It is a pleasure to be here in any case.

Senator SCOTT. Thank you, sir.

Carl Elliott, chairman, State Technical Services Evaluation Committee.

STATEMENT OF CARL ELLIOTT, CHAIRMAN, STATE TECHNICAL SERVICES EVALUATION COMMITTEE, BIRMINGHAM, ALA., ACCOMPANIED BY EDWARD BISONE, EXECUTIVE SECRETARY, STATE TECHNICAL SERVICES PUBLIC EVALUATION COMMITTEE

Mr. ELLIOTT. Mr. Chairman, I would like to ask that Mr. Ed Bisone, the executive secretary of my committee, sit with me, if he may.

Senator SCOTT. Yes, certainly.

Mr. ELLIOTT. Thank you.

Senator SCOTT. Before you testify, Mr. Elliott, may I at this point ask the reporter to include in the record letters from David C. Emery, executive director, Vermont Office of Technical Services, to Senator Aiken of Vermont and John W. Oswald, president, University of Kentucky, to Senator Morton of Kentucky, bearing on these hearings, and expressing their interest in them.

(The material referred to follows:)

VERMONT OFFICE OF TECHNICAL SERVICES,
Montpelier, Vt., April 23, 1968.

Senator GEORGE D. AIKEN,
*Senate Office Building,
Washington, D.C.*

DEAR SENATOR AIKEN: I would like to call your attention to the fact that S. 3245 introduction of a bill to extend authorization of passage of the Technical Services Act of 1965 has been introduced to the Senate.

Small states such as Vermont who are limited in their ability to acquire vast amounts of technology find the Technical Services program is of immeasurable value to its small business and industry. Although we have been limited by funding over the past three years, we have been able to provide to Vermont business and industry a comprehensive program of extension services which included educational extension, field counseling, and a limited reference service. During the past year we have provided a total of seven programs, five of which were in the educational extension field. These programs have been strongly supported by business and industry, who have indicated a desire for many more in the future.

We have under examination at this time, a total of 24 extension programs of a conference and seminar type, which we hope to provide in fiscal year 1969. In addition, we are applying for a special merit program to provide a complete reference service of available human and physical resources of information wherever located which, if proven feasible, can become the guide for all small state reference systems. We intend to provide an extension field counseling service for the coming fiscal year.

It is the hope of this Department that you will seriously consider maintaining at the minimum the level of funds that was granted in fiscal year 1968. If there is any other information about our program which you would like to have to justify such a request, I shall be very happy to provide it at any time.

Sincerely yours,

DAVID C. EMERY, *Executive Director.*

UNIVERSITY OF KENTUCKY,
Lexington, Ky., April 9, 1968.

Hon. THRUSTON MORTON,
U.S. Senate, Washington, D.C.

DEAR SENATOR MORTON: I should like to urge your support of Senate Bill S. 3245, providing for a two-year extension of the State Technical Services Act. This Bill is of special importance to the University of Kentucky and to the Commonwealth of Kentucky, particularly at this time when the University is expanding its extension programs throughout the state to provide greater services

to the people in areas other than agriculture. The assistance received under this Act will help us realize our goal and will, at the same time, be of great benefit to the entire Commonwealth.

Sincerely,

JOHN W. OSWALD.

Senator SCOTT. And may I also say to Carl Elliott that I am delighted to greet a colleague. I won't say "an old colleague." I would rather use the old French word "ancien," which implies long-time and amiable association with. We are delighted to see you here again, Carl. I understand your committee has just completed a field tour, including Pennsylvania. Is that right?

Mr. ELLIOTT. Yes, sir.

Senator SCOTT. You go right ahead.

Mr. ELLIOTT. Thank you very much, Mr. Chairman. We have an outstanding citizen in Birmingham, Ala., named Bill Engle, who always says in his speeches that every fellow ought to pay his civic rent. Now, I accepted the chairmanship of this Public Evaluation Committee, without compensation, in an effort to pay my national civic rent. And I have enjoyed serving in that capacity very much.

And we do have a very fine committee, Senator Scott. Mr. Everett Zurn, whom you mentioned a minute ago, serves on our committee. We have looked at the State technical services program in Pennsylvania under Dr. Marlow, and I want to say that it certainly is one of the very finest programs in the United States of America. I have been inspired, myself, by the lengths that the administrators and officers of that program have gone to to make it work as it should with altogether too little money to effectuate a real good working program.

We recommended, on the basis of our hearings—we held some regional hearings and called in representatives from some 30 States. Our recommendation No. 1 was that this act should be extended.

We feel, or I happen to feel most especially, that there is no domestic program that has greater possibilities for the good of America and its small businessman than does this one. And we hope, my committee hopes very sincerely, that you will vote to extend it.

And I, as a member of that committee, congratulate you, Senator Scott, on the foresight that you had in designing, or helping to design this act a few years ago. As you know its purpose was to transfer the technology that we were developing through our vast Government research and development program, and to make that technology available to the type of American business, namely its small business, that otherwise would have very little chance to obtain the benefits of the technology.

Our second recommendation was that increases in funds be authorized or made, if possible, and at the earliest possible date.

I say this advisedly. I served in the House for 16 years and part of that time with the illustrious chairman of this committee, and I have had an opportunity across the years to look at many Government programs. I have never seen a Government program that has operated as efficiently, with as little money, as this one has been able to do.

The dedication of its servants and directors and employees has been something to behold.

Our third recommendation is that, if possible, more money be put into the program to encourage more regional and interstate programs.

One of the most exciting sessions that our Public Evaluation Committee had was that of hearing a description of the New England, the prospects for the New England regional program, which is just now getting underway and which looks forward to having a small grant in a few days to help it with some projects that it will undertake.

Of like tenor was the testimony we heard from the Rocky Mountain States, where six States of our country are coming together to formulate an interstate program that apparently will do a great deal of good.

We recommend also that there should be a national advisory committee to review the activities under this act and make recommendations to the Secretary of Commerce and the President on a continuing basis.

We recommend that the Department of Commerce should make available and conduct a training program for State personnel engaged in program activities. And I might say that that recommendation has already been put into effect, and the first of those training short courses is about to get underway.

We felt that one of the weaknesses of this act—and it's pretty largely a weakness of lack of funds—but one of the weaknesses of the act, as it is written, is that so far we haven't had the interchange and the swapping of ideas between States with respect to this program that we should have had.

Senator SCOTT. In other words, what is needed is a sort of cross-fertilization.

Mr. ELLIOTT. Yes, sir, that is a better way to state it, Senator. It certainly is.

And I would like to close my formal remarks by saying first that this program is badly needed in our country, as much as any other domestic program I know.

Second, the program has barely been through a 2-year, really only a 2-year period of tooling up and experimentation. I say 2 years because most of the States got started very late. My State of Alabama, for instance, received its first grant about a year ago now, a year and 1 month ago, so really the program there is in its second year.

Third, I would like to say that I know of no other program—no other self-help program, I might say—that is designed to transfer, on a fairly massive scale, the benefits of our technology to our young and small business establishments. I looked up this figure for my State. We have 22,000 businesses that have less than a hundred employees each. And that is a pretty good mirror of the whole country.

Our business, the small business, runs into thousands. And the small businessman frequently can't have an engineer, or he can't have a highly skilled technical man.

It is to the everlasting credit of these State technical services people that, where they could, they have gone to the small businessman and have said, "What can we do to help with the technology in your field?" And they have invited him to a meeting, and if he said he couldn't come, then they set the meeting at night or on Saturdays.

We have a lot of these meetings that are held all over the country on Saturday so as to be sure that the small businessman can have the benefits. Somebody mentioned a little while ago something about the specific cases of wonderful accomplishments that have been made

under this act. And Mr. Phil Reily, the very able and astute director of this program, has compiled a list of specific examples in specific industries where the technology transferred to these industries through the State technical services mechanism has been of inestimable help.

Now, the weakness that the program, I think, has, Senator Scott, the weakness, the one big weakness in this program all across the country is the fact that it has not nearly enough field services, not enough transfer agents, as the Small Business Committee of the Senate said yesterday in its report.

We need people to go out, to see the small businessman and to help him with this transfer of technology. A few States have done a beautiful job in that field. Pennsylvania has done something, as I recall, and Tennessee, I believe, has a fairly large program of field services.

And in those States where there is a field service, even small, two or three or four or five people for the whole State, it is from those States that you get the best examples of actual monetary and employment benefits to the particular industry involved.

The chairman of this committee and I have been in the business in the past—I have been in the business, he still is in seeking votes, and he and I know that there is no impression that you make on anybody like going to see him. And the weakness of this program now is that we don't have enough people to go to see the small businessman and tell him what might be available by way of new technology to help him.

And, you know, it's a pretty fearsome thing, Senator Scott, when you think about the fact that most of these great advances in science that we are making today we have known about for 25 or 30 years. The transfer and use of our technology in this country, as a general rule, I would say, is at least 20 years behind.

Now, here is a program to close that gap, so to speak, as it affects the small business establishment of this country. And in that regard, it will make America, on a continuing basis, stronger and stronger.

Senator Scott. A good illustration of that, I think, is the lag in applying technology to the movement of people to and from their jobs, for example. We have known for a long time how to get people to and from their jobs.

But I flew down here the other day and spent more time over at the airport than I did in the air. This kind of thing is a technological failure somewhere along the line. There are plenty of experts who can tell us what you can do about it. But we have fallen behind in the doing.

Excuse me. You had already answered one question I was about to ask you. So I was admiring the way in which you read my mind.

Mr. ELLIOTT. Well, thank you, sir.

This finishes my statement, Mr. Chairman. If you have any further questions, I will do my best. I am not an expert in this field.

Senator Scott. Yes, sir. I did have two that I wanted to ask.

You have partly covered the comments of the Senate Select Committee on Small Business, Subcommittee on Technology, and their report for technology transfer, which criticizes inadequate Federal funding, which is not a criticism of the program but an affirmation of the need for the program.

And the same commentary on lack of incentive for regional planning fits right in with the fact that there has to be a certain degree of austerity in the limitation of funding. And I know from your state-

ment you are aware of these recommendations, that more ought to be done to encourage regional participation.

Can you give us any suggestions as to what steps might be taken by the Department or by your committee, or by anyone, to speed this trend toward technology exchange, other than the enlargement of the program by increased funding, which is certainly desirable?

Mr. ELLIOTT. Well, I feel, Senator, that the people who administer this program—Phil Reily and Dr. Kincaid particularly—are entirely aware of the great benefits to come from interstate and regional programs.

They are faced with taking this year \$6.5 million, or \$6.4 million, I believe—and spreading it over the program in the States to get those programs going, after a fashion, and not having very much money left for the regional programs at that point.

I have talked to Mr. Reily about this very point, and he has had the idea, with which I agree, that the main thrust of the act is that we get the State programs going. They have, in the context of the act, a sort of priority. But that priority can be easily, easily settled into place if we had another million or two dollars that could be spent, say, on these regional and interstate programs.

I think the regional and interstate programs are the trend of the future. I believe they have inherent in them a great capacity for wonderful results in this field. And they will, for the long run, enable our Government to save a lot of money in this whole program, because there can be concentrations of—maybe “concentration” sounds a little big. There can be groups of experts assembled in the New England region and in the southeastern region and in the Lakes region that can attend better and more cheaply to the problems of technology transfer in those areas.

Senator SCOTT. Do you have any reaction to the discussion that has been going on with regard to the funding of programs of business management or other programs not involving the direct transfer of scientific and engineering information?

Mr. ELLIOTT. Yes, sir. I think that the Department had, till the recent ruling that its lawyer referred to here a while ago, I think the Department had entirely too strict an attitude about that.

I believe there is a real field for the operation of management short courses, that are fairly directly related to the problem at hand—of technology transfer. But I hope the time may come—and I realize it can't be now—but I hope the time will come when we will be able to give some real attention to the management phase of this thing.

Management is inherently concerned with this whole problem, it seems to me. And it's awfully hard to divorce one from the other in many situations.

Senator SCOTT. We thank you for your testimony. I congratulate you on the way in which you are meeting your civic rent. And I am aware that you are doing so in addition to the conventional quarterly remittances to the Internal Revenue.

Thank you very much.

Mr. ELLIOTT. Thank you very much.

Senator SCOTT. I am going to go out of order, if I may here, and call Dr. Donald E. Marlowe, because I understand Dr. Marlowe has a plane to catch and has a very brief statement.

Dr. Marlowe, will you proceed in your own way and, while your statement is brief, if you are pressed for time and wish to summarize it, you may proceed according to your own desires.

STATEMENT OF DR. DONALD E. MARLOWE, DEAN OF ENGINEERING AND ARCHITECTURE, THE CATHOLIC UNIVERSITY OF AMERICA, REPRESENTING THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS, WASHINGTON, D.C., ACCOMPANIED BY WILLIAM PATTON, GENERAL COUNSEL, NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Dr. MARLOWE. Thank you, Mr. Chairman.

I have with me Mr. William Patton, the general counsel of the National Society of Professional Engineers.

My testimony is largely contained in the latter part of my statement. I will read it directly.

Mr. Chairman and members of the committee, I greatly appreciate this opportunity to present the views of the National Society of Professional Engineers on S. 3245, a bill to extend the authorization of appropriations under the State Technical Services Act during fiscal years 1969 and 1970.

My name is Donald E. Marlowe. I am a registered professional engineer, and presently I am serving as chairman of the Research and Development Committee of the National Society of Professional Engineers. By way of further identification, I am dean of engineering and architecture at Catholic University and also serve as chairman of the advisory committee for the State technical services program in the District of Columbia.

The National Society of Professional Engineers is a nonprofit organization composed of 53 State and territorial professional engineering societies with more than 500 chapters and over 66,000 members, all of whom are qualified under applicable State engineering registration law.

Our membership includes professional engineers engaged in virtually every specialized branch of engineering practice and type of employment—education, private practice, industry, and government.

We appear today in support of the State technical services program. We believe the Federal assistance provided to the States under the program is playing an important part in helping to stimulate the efficient use of engineering technology throughout the country, and is highly beneficial to business, industry, and the general public. We urge that the program be continued as provided in S. 3245.

In 1965 it was my privilege to testify before this distinguished committee to express our society's support for establishment of the State technical services program. We thought then that the proposal was an excellent one and would be of great benefit to industry, to the engineering profession, and to society as a whole.

We had some concern that certain language in the enabling legislation as originally drafted might be interpreted to set up federally financed technical services in competition with engineers in private practice, and suggested amendments to avoid this possibility.

Administration officials assured us what was intended was a technical information dissemination program, to help stimulate more

efficient use of scientific and engineering information. Congress, in turn, adopted clarifying amendments to assure that the program would not operate in competition with private consulting engineers.

Because of our strong support for the basic purpose of the State technical services program, coupled with our initial concern that it might provide federally subsidized technical or engineering services in direct competition with private firms or individuals, we have closely observed the development and progress of the program since its inception. We are happy to report to the committee that, based on our observations, we believe the program is well on its way toward achieving on a continuing basis the purposes set forth in section 1 of the act—that is, wider diffusion and more effective application of science and technology for business, commerce, and industry—but without interfering with the privately developed and privately operated technical services provided by consulting engineers.

We are convinced, in fact, that in addition to helping stimulate more efficient use of engineering technology in business and industry, the program has actually generated increased business for engineers in private practice. We have witnessed a number of cases where increased awareness of technical possibilities by businessmen, apparently as a direct result of the program, has resulted in their retaining consulting engineers when they probably otherwise would not even have thought of doing so.

In summary, Mr. Chairman, we are convinced that the State technical services program is an excellent one, and is beneficial to the general public, business, industry, and the engineering profession. We believe the program is operating in the interest of the economic well-being of the Nation, and should be continued.

We sincerely appreciate this opportunity to present our views, and will be happy to answer any questions or provide any additional information or comments the committee may desire.

Senator SCOTT. Thank you, Dean Marlowe, and I have only one question. Would you say that this committee might fairly conclude that the prohibitions already contained in the act, or the inhibitions already contained in the act to guard against the duplication of services readily available from private, technical, and professional consultants are adequate?

Dr. MARLOWE. They are adequate and effective.

Senator SCOTT. Thank you very much, sir.

And I hope you don't have to stay in the air longer than you stayed en route.

May I call Dr. H. Leroy Marlow, director of Penntap, from University Park, Pa.

And the next witness after that will be Dr. Adams.

Dr. Marlow, as I said in my opening statement, we want to welcome you here, along with Mr. Ross Renninger, when he testifies. I have your statement in front of me, and would you kindly proceed in your own way.

STATEMENT OF DR. H. LE ROY MARLOW, DIRECTOR, PENNTAP, UNIVERSITY PARK, PA.

Dr. MARLOW. As director of Penntap, the Pennsylvania Technical Services Program, I wish to thank the committee for the privilege of testifying on S. 3245, the bill which would extend the authorization

of appropriations under the State Technical Services Act during fiscal years 1969 and 1970.

The Commonwealth of Pennsylvania was one of the first States to implement the State Technical Services Act of 1965. In June of that year, 3 months before the signing of the act, the Governor of Pennsylvania named the Pennsylvania State University as the designated agency in the Commonwealth. Overall responsibility for Penntap rests with the continuing education division of the university.

Each year since the inception of the act, Pennsylvania has conducted an active statewide program of technical assistance for its business and industry. Currently, our third consecutive STS annual program is operating, and our fourth year (1969) program is being formulated.

In addition to the accomplishments previously reported to the Office of State Technical Services, Penntap has been the stimulus for making possible many spinoffs. By spinoffs here, I believe that Penntap has supplied the impetus which has caused things to happen.

Included in this would be, one, the implementation of a research program at the Franklin Institute on treatment of metalplating shop effluents. This research is being sponsored by the National Association of Metal Finishers.

Two, initiation, at Bucknell University, of a seminar on warm air heating. Additional technical seminars for industry which will operate without Penntap financial support are planned.

Three, expansion of "the Sound of Progress," a radio broadcast program, which is on for 5 minutes a day for 40 radio stations in the Commonwealth, and has now gone on its own. It was started with the initiation of Penntap funds.

It is now self-supporting. In addition, the other States have asked to have this expanded into their area, and we are currently working with two other States to do this.

Senator SCOTT. That is Delaware and New Jersey.

Dr. MARLOW. That is correct, sir. This would include the dissemination of not only technical information, but also other data having economic impact. This project, conducted by the Pennsylvania State University, is now operating without Penntap funds. Two States, Delaware and New Jersey, have requested that "the Sound of Progress" program be expanded to include the Tri-State area. Representatives of the three agencies are pursuing this idea.

Four, development, at Drexel Institute of Technology (one of the institutions participating in the MAP coupling program), of a short course in "Design With Composite Materials."

Five, development of preliminary plans for establishing a nationwide "Powder Metallurgy Technical Information Clearing House" at the Franklin Institute. This clearinghouse would offer services expanded from the base program begun through Penntap.

Six, coupling of faculty of six major Pennsylvania universities with top industrial scientists in a unique project to assist in answering industry's technical problems. This rare combination of talent was made possible by the impetus provided by Penntap.

Each year proposals are solicited from all qualified institutions in the Commonwealth. Then an impartial evaluation panel reviews, evaluates, and suggests projects to be included in the annual programs. Finally, the approved annual program is cosponsored by the United States and Pennsylvania Departments of Commerce.

Initial evaluation indicates that Penntap is a promising venture with great potential. However, it is almost impossible to evaluate a program of this type in the same calendar year in which its activity is approved for funding. A few action projects in the program may give preliminary indications of success, but there must be an elapsed amount of time between the completion of a project and its true economic evaluation. Since Penntap is the sum of its individual projects, it cannot be evaluated accurately until its projects are measured.

Moreover, since industrial application of technical information generally requires much time, thought should be given to delaying the evaluation of projects. Perhaps even funding—up to, say, 5 percent of the total project budget—should be included in the initial project cost for this delayed evaluation. Thus, a more accurate evaluation would be made possible.

The most important feature of Penntap is that it has provided for an effective, unified system of information transfer. The STS act has stimulated an industrial assistance venture that probably would never have otherwise happened. In all probability, there would have been no coordinated attack on the overall needs of this Commonwealth nor the needs of the other States. And furthermore, there would not have been the coordination of competent teams of technical experts to tackle these needs.

During the first 2 program years (1966 and 1967) Penntap services were available without cost to the user. This allowed the small businessman with limited funds to use Penntap services. However, this also meant that only 3 percent of the Penntap budget came from nongovernmental sources.

Beginning with the 1968 program, fees are being charged and industrial contributions sought. Therefore, in the future, such nongovernment funds will provide increasing amounts of the Penntap budget. The current Penntap philosophy is to use the Federal and State tax dollars as seed money. The idea is for Penntap to initiate the projects which in turn will become self-supporting as soon as possible.

Please remember, this seed money idea does not mean that Federal funds should be eliminated. It would be disastrous to the initiation of new projects to eliminate these Federal funds. Penntap's successes and the previously mentioned spinoffs have resulted from Federal support of the original projects. The successful spinoff program would probably continue if Federal funds were eliminated, but the initiation of new projects, which would lead to other spinoffs, would not be possible.

Senator SCOTT. May I interrupt here for the purpose of clarifying something, because I am sure I read your intention here and interpretation of the very use of the word spinoff. These activities referred to as spinoffs were not themselves presented as a direct part of the State's approved technical services program. They are benefits which resulted therefrom. Is that not correct?

Dr. MARLOW. This is correct, sir. In a few cases where authorized, they have started under the act and have now been expanded with other funds. In other cases they developed from an awareness which allowed this to happen.

Senator SCOTT. You go right ahead.

Dr. MARLOW. Also, it would be short sighted to think that there will be a day when Federal support of the program will be completely withdrawn. For example, the library information programs offer an industrial service very similar to that given by the agricultural agent. While some industrial support for many of these programs will be forthcoming, I personally think it unrealistic to believe that such services will ever be entirely self-supporting. Information programs presently striving to be self-supporting through industrial contributions are finding it very difficult.

Prior to the State Technical Services Act and Penntap, there were numerous scientific and technical activities within the Commonwealth, but none were on a statewide, coordinated basis. Many public and private institutions offered a full complement of services to business and industry.

While these services and the technical expertise they represent have never been cataloged, they would be impressive if listed in a single volume. In addition, on- and off-campus short courses, workshops, seminars, et cetera, on subjects covering the entire technical spectrum, have been offered by the Pennsylvania State University, the University of Pittsburgh, and Temple University—to name a few—in their continuing education programs. However, with all of these services, there was no unified, statewide information service of the nature that now exists under STS and Penntap.

If the State Technical Services Act is to reach the great potential which it has, consideration must be given to longer range funding. This would give assurance to project personnel that the project, if successful, could continue for more than 12 months. It should be remembered that it is extremely difficult to hire a competent industrial librarian, for example, under the conditions of the present grant system.

I do not have to tell you that technology is rapidly changing and becoming more complex. Penntap has only begun to scratch the surface. If Penntap—and the other STS programs—are to reach their potential, more funds will be necessary.

Also, the debate over the broadening of the act to include the management sciences must be resolved. This will necessitate a definition of the real purpose of the act. If dissemination of technical information is the main purpose, then the area of management science should not be included. However, if the primary emphasis is to improve the economic base so that business, commerce, and industry can better assimilate technical knowledge, then management sciences must be included. If the management sciences are deemed necessary, the State Technical Services Act should be broadened rather than create a separate agency to administer these social sciences.

Now, I realize the term "social sciences" is a gray area here, and I realize that, on definitions, we could probably spend most of the morning. But what I am saying here is, when the purpose of the act is determined, if it will be broadened further then the definition we had this morning, the act should provide for this so we do not create a separate agency to try to administer the "social sciences."

Senator SCOTT. Amen.

Dr. MARLOW. We in Pennsylvania are currently preparing to submit our fourth annual program. This does not mean that we have 3 years of experience behind us. In reality, Penntap is only 21 months

old, as the first contracts with participating institutions were signed August 1, 1966.

Allowing for the transition from paper projects to operational ones, most of the 1st-year projects did not become functional until January 1967. This means that while we have had some measurable successes, evaluation of the total effort at this time is unrealistic and not truly indicative.

It is interesting to note that, to date, Penntap has been able to direct 91.7 percent of all project dollars toward actual dissemination of technical information. Only 8.3 percent of the budget has been used for total administration of the program. This administration figure includes the costs incurred by the Advisory Council and the Evaluation Panel, as well as such items as supervision, printing, travel, and the coordination of the participating institutions.

This figure does not include the cost of such services as accounting and contracting which have been donated by the Pennsylvania State University as the designated agency.

I have only given you a brief overview of Penntap and STS in Pennsylvania. A more detailed report has been prepared, and I would like to request that this detailed report be included in the record.

Senator SCOTT. It will be so done.

Dr. MARLOW. Thank you, sir. In conclusion, I want to emphasize that we in Pennsylvania believe the State Technical Services Act is beginning to show success, can meet a real need, and has great potential. Moreover, if Penntap and its counterparts in the other States are to reach their potential, substantially more funds are necessary. Therefore, I strongly urge you to do as much as you can to make available the maximum amount of funds. These moneys will assure the continuation of this service to business, commerce, and industry.

Thank you for the opportunity of being here this morning.

Senator SCOTT. Thank you, Doctor. It was very helpful testimony. And I would assume from your statement that you would favor a stronger Federal commitment to State technical services than that in the proposed bill now before us, recognizing the implications of the wartime pressures, but nevertheless, in the long-range, long-run view of the future, I think we may assume, may we not, from your statement, that you favor a stronger and more widely based program than we now have?

Dr. MARLOW. Yes, sir; that is right.

Senator SCOTT. As soon as we can possibly get it.

Now, in your statement, Doctor, you discuss the possibility of broadening the State Technical Services Act to include specifically programs dealing with management sciences. Do you see any problem here, in view of the act's stated prohibition against the duplication of services "readily available in the States from private services, professional consultants, or private institutions?"

I have in mind particularly the number of professional consultants and private institutions already in the management field.

Dr. MARLOW. In this area, sir, as you well know, in the Commonwealth of Pennsylvania, we have a number of management services now that are readily available. Any expansion of this area should be in those areas where the need is not being readily met now.

Senator SCOTT. And have you considered what Penntap would do if, for example, because of the current war, it becomes necessary to

stabilize Federal services under the State Technical Services Act at present levels, or thereabouts?

Dr. MARLOW. Yes, sir; we have. We spent quite a bit of time in this area. Penntap will continue, because we are meeting a need, and our industrial support is increasing. However, the impetus that we could give to starting new programs to meet new needs would be greatly hampered, and some of the momentum which we are now starting to feel would certainly be deterred.

Senator SCOTT. Would you perhaps have to consider increasing user charges in certain areas?

Dr. MARLOW. We look at this each year and, as I indicated, we will be doing this more in 1968 and in our 1969 program.

There is a point here that the people that need it most are the smaller companies. And they are not in the best position to take care of this, where dollars may be a deterrent.

Senator SCOTT. A reference has been made this morning to the desirability of additional regional cooperation under the State Technical Services Act. Mr. Elliott mentioned that, for example. Since the act specifically authorizes interstate compacts and agreements, do you feel that these provisions of the act, sections 7 and 8, are sufficient? Or do you feel additional incentives are needed to encourage broader action in this direction?

Dr. MARLOW. Well, Mr. Chairman, we have been planning with our surrounding States in this area. But we were concerned in getting the technical information to Pennsylvania industry first. This is where our emphasis has been.

As we meet this need, as the momentum continues, then we will start broadening our horizon. We have had a number of planning sessions to continue to move in this area, but we will continue to give our priority to the State needs and then move in that direction.

I think the act is adequate. It is a matter of staffing, funds available for this purpose, and time.

Senator SCOTT. I may add that my colleague, Senator Clark, and former Governor Scranton and Governor Shafer and I have discovered the difficulty in bringing about agreement through any State compacts. I think they are highly desirable, but they often take many years when you have to deal with the legislative and executive departments of several States and the Federal Government.

Dr. MARLOW. Yes, sir.

Senator SCOTT. Thank you very much, Dr. Marlow. We appreciate your testimony.

(The additional report submitted by Dr. Marlow follows:)

PENNTAP: STS IN PENNSYLVANIA—A COMPANION REPORT TO THE STATEMENT OF DR. H. LEROY MARLOW

PENNTAP, the Pennsylvania Technical Assistance Program, was organized as a result of the federal State Technical Services Act of 1965. Its purpose is to disseminate the latest technological information to business, commerce, and industry in the Commonwealth of Pennsylvania.

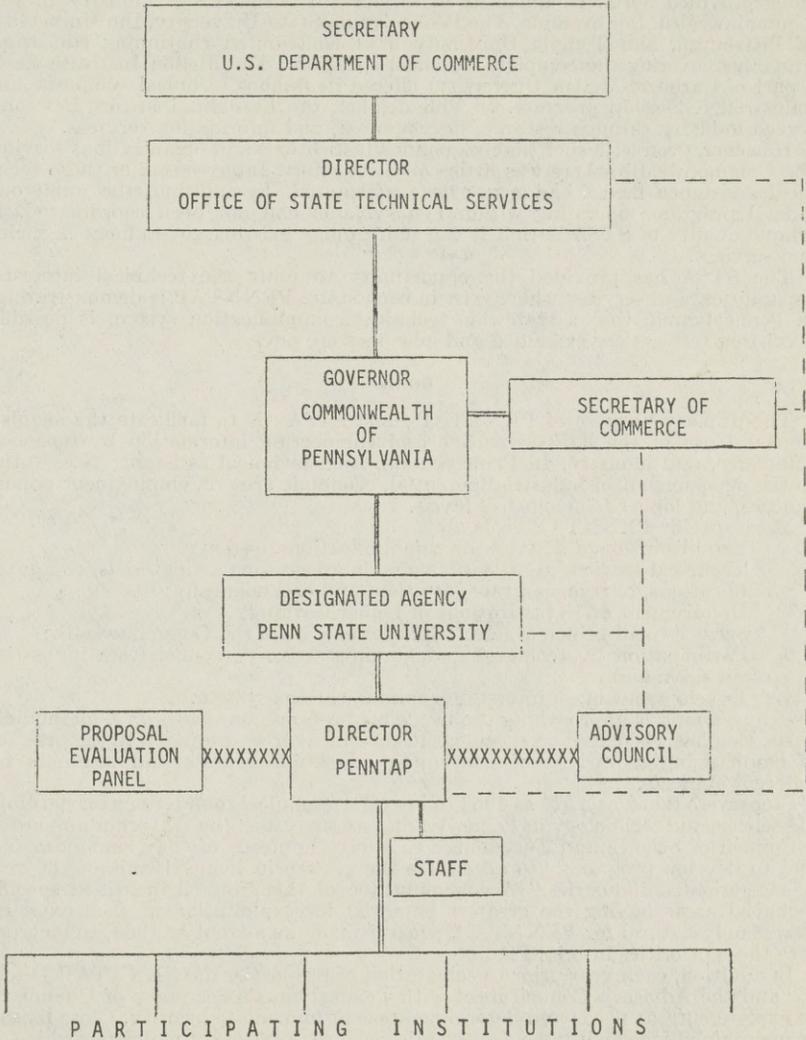
In June, 1965, the Governor of Pennsylvania selected The Pennsylvania State University as the Designated Agency for the Commonwealth. Then, the Executive Committee of the Board of Trustees of the University approved the establishment of the Pennsylvania Technical Assistance Program at the University.

Responsibility for PENNTAP was given to the Continuing Education division of the University. This provides closer coordination of the University-based, non-instructional services designed to assist business, industry, government, and

other organized groups. Such coordination helps to assure maximum use of the University's resources.

The PENNTAP Director, who is responsible for the program, reports through the Director of Continuing Education to the President of the Pennsylvania State University. The organizational structure is illustrated in Figure 1.

FIGURE 1
PENNSYLVANIA
PENNTAP ORGANIZATION CHART



==== Direct Responsibility
 ---- Information Exchange
 xxxxx Advisory

To fulfill the requirements of the Act, an Advisory Council was appointed by the Designated Agency. The Council, whose membership represents broad community interests, evaluates the annual State program and acts in an advisory capacity to the PENNTAP Director.

Qualified institutions of higher learning in Pennsylvania—colleges, universities, private non-profit institutions, and appropriate government agencies—are invited annually to submit proposals of technical assistance projects. PENNTAP then contracts with the proposers of approved projects to carry out the technical services.

PRIOR SERVICES

Before the State Technical Services Act, numerous public and private institutions provided a full complement of services to business and industry in the Commonwealth. For example, The Pennsylvania State University, the University of Pittsburgh, and Temple University have contributed continuing education programs covering the complete technical spectrum. The Mellon Institute (now a part of Carnegie-Mellon University) offered its famous technical symposia and industrial fellowship program. In Philadelphia, the Franklin Institute has long served industry through research, development, and information services.

However, even with such highly qualified institutions and organizations serving the Commonwealth, there was little collective effort. Interrelation of these technical assistance media had never been attempted. In addition, the numerous federal programs operating within Pennsylvania had not been coordinated. A unique quality of STSA is that it can unify many existing government agencies and services.

The STSA has provided the opportunity to unite the technical interests, capabilities, and services which exist in each state. PENNTAP is demonstrating, in Pennsylvania, that a statewide technical communication system is possible if existing services are expanded and new ones are devised.

GOALS

The primary purpose of PENNTAP—and STSA—is to facilitate the acquisition and use of the latest scientific and engineering information by business, commerce, and industry. In Pennsylvania, such technical assistance is essential to the development of industrial potential, economic growth, employment opportunities, and higher technological levels.

More specific PENNTAP goals are:

- Establishment of a statewide communications system;
- Technical services in at least five main areas: such as materials, computer applications, bioscience, transportation, and oceanography;
- Involvement of 18 institutions of higher learning;
- Service to all principal industrial centers within the Commonwealth;
- Participation by technical and administrative personnel from industries of all sizes; and
- Development of an interstate communications system.

Pennsylvania is approaching the needs of the Commonwealth on a methodical basis. Emphasis is placed on specific fields of endeavor as compared to the practice of emphasizing a variety of continuing education courses and seminars on different subjects.

Steps were taken as early as 1963 to lay these technical foundations for developing science and technology in Pennsylvania. At that time, the Governor appointed a Council of Science and Technology to study the needs of the Commonwealth and to develop programs "to accelerate the growth in Pennsylvania of the new science-oriented industries." A subcommittee of this Council identified specific technical areas having the greatest potential for exploitation in Pennsylvania. It was only natural for PENNTAP, when it made its advent in 1965, to incorporate these priorities into its Plan.

In addition, each year prior to solicitation of proposals, the PENNTAP Director and the Advisory Council meet with Pennsylvania's Secretary of Commerce to explore current needs and determine areas of immediate priority. Close liaison is maintained, too, with the Governor's Science Advisory Committee which is keenly aware of the technical needs of business, industry, and the Commonwealth.

PROJECT PROPOSALS AND EVALUATION

Since Pennsylvania has a wealth of public and private institutions which have vast experience in providing service to business and industry, PENNTAP uses

these resources for carrying out the STSA. Each year, after the priority areas have been established, the more than 100 potentially qualified institutions in the Commonwealth are invited to submit proposals of specific information dissemination projects.

To encourage institutions and to aid them in preparing their proposals, a *Proposal Guide*, establishing format and desired information, was published for the institutions' reference. (Pennsylvania is the only state known to assist the qualified institutions with such a publication.) Advisory services of the PENNTAP staff are also available to the institutions, at their request, to assist in the preparation of proposals.

PENNTAP, to date, has solicited proposals for four program years: 1966-1969. A total of 92 proposals have been received from 18 institutions. Of these, 36 have been selected for inclusion in the Annual Program.

In the area of proposal evaluation, Pennsylvania is unique in that it has a separate, impartial Evaluation Panel to review the project proposals. The Panel, acting in an advisory capacity to the PENNTAP Director, evaluates and suggests the projects for inclusion in the Annual Program. The seven Panel members, none of whom are associated with any of the participating institutions, are primarily from business and industry. Two of the members are elected from the Advisory Council; all are appointed by the Designated Agency.

In choosing the projects to implement STSA in Pennsylvania, emphasis is placed on uniqueness, practicality, and projected significance. While all PENNTAP projects reflect this, three are particularly outstanding.

CURRENT PROJECTS

The Library Information System, established by The Pennsylvania State University, provides organized technical information to industry in response to industrial inquiries. An industrialist from any section of the Commonwealth can submit specific technical questions to the System. After a search of the literature is made, the pertinent data is sent to the inquirer. By using the facilities of the University's 20 Commonwealth Campuses and Centers, the Library Information System is easily accessible to business and industry in every section of Pennsylvania. Another unique feature is that this project deals with the specific problems and needs of industry as defined and requested by the industrialists themselves.

Another library project, conducted by the Carnegie Library of Pittsburgh, is an interesting and novel venture: a mobile science-technology library. This is the only known mobile library serving the scientific and technical needs of American enterprise. This specially-constructed van is stocked with the latest scientific and reference materials of interest to industry. As the van travels through western and central Pennsylvania, the library staff conducts seminars at plant locations and shows industrialists how to cut through the unfamiliar maze of library procedures to obtain information. The van, valued at \$25,000, was purchased under the provisions of the Library Services and Construction Act, and has been made available—without capital cost—to PENNTAP.

The third distinctive project couples the expertise of six major Pennsylvania universities with ten industrial scientists in providing a series of seminars on materials technology. This cooperative effort of academic and industrial personnel is, in itself, unique; that it is producing an effective program for industry is even more significant.

In addition to these three programs, PENNTAP offers in-depth library services for industries using metal plating and coating, powder metallurgy, and carbon-graphite technologies. Seminars on color measurement, materials technology, textiles, and computer applications in small industry are being conducted. Radio, television, and films are also being tested as media of information transfer.

Many meritorious projects have been proposed for PENNTAP's 1969 Annual Program. However, the number of good, active projects which can be undertaken will depend solely upon the availability of funds.

Even though a true evaluation of PENNTAP and its projects cannot be made at this early date, there have been numerous successes—in both numbers using the services and industrial applications of information. These have been reported to the Office of State Technical Services in the Annual Reports and through more informal means. "Spin-offs" from PENNTAP projects have been mentioned previously.

PROGRAM FUNDING

The Designated Agency of the Commonwealth of Pennsylvania received, in late 1965, a planning grant of \$25,000 to organize PENNTAP and to prepare

the *Five-Year Plan* and the first Annual Program (1966). An accounting of this money was submitted in the 1966 Annual Report. Currently, a request for a second planning grant is pending. This second planning grant will be used to evaluate present activities and to determine potential areas of service.

In addition, PENNTAP has received approval of three annual program grants, all of which were on a matching fund basis. To date, approved program appropriations from both the Federal and the Commonwealth Departments of Commerce amount to nearly a million dollars. Of this amount, \$476,399 has come from the Federal government; \$500,000 has been from the Commonwealth; and approximately \$25,000 from private sources.

Beginning in 1969, there will be an increasing amount of non-government funds in the total PENNTAP budget. First, a total of \$48,911 in industrial or participating institution support has already been included in the budgets of the projects proposed for that Program. Secondly, PENNTAP has begun in its current program to collect fees and contributions which are being held in escrow for use in the 1969 Program. To present knowledge, Pennsylvania is the only state holding funds in escrow for use in succeeding annual programs.

CONCLUSIONS AND RECOMMENDATIONS

As stated before, the STSA is a very promising venture. It can provide a significant stimulus to economic and technological growth. However, there are problem areas whose resolution could result in an improved, more meaningful State Technical Services Act.

In addition to the previously suggested recommendations (longer-range funding and definition of the purpose of the Act), the following warrant consideration:

1. The Office of State Technical Services, the Commonwealth of Pennsylvania, and the Designated Agency must find ways of reducing the long delay between submission of proposals by participating institutions and actual funding and initiation of the projects. The existing lag time discourages some of the more qualified academic personnel from submitting proposals because they are reluctant to commit themselves for such a long period of time in advance. This delay also constitutes a morale factor: proposals are accepted but starting dates cannot be guaranteed.

2. Evaluation is a continuing problem to which there is no easy answer. To achieve a true evaluation of a project, there should be an elapsed amount of time between the completion of the project and its evaluation. It is not only unrealistic, but also impossible, to evaluate a state program in the same calendar year in which its program activity is approved for funding.

The question of how much the experimental phase of STSA should influence evaluation needs to be resolved. If the programs are to be truly experimental in nature, inclusion of unique projects might also adversely affect the chances for a proven success or a positive evaluation.

3. The State Designated Agency needs more flexibility in administering approved projects. The Office of State Technical Services has every right to, and indeed should, hold the Designated Agency accountable for performing the program as approved. However, the excess amount of administration now required—such as control of individual budget line items—causes additional paper work, a time delay, and uses effort that could be spent on more productive pursuits.

4. The STSA was designed as a federal-state partnership; however, to date, the administrative procedures have been imposed rather than developed jointly. In many cases, these have not helped the states in their fostering of the Act. It would be helpful, and the needs of the individual states could be met more fully, if there would be a genuine movement towards a federal-state partnership. The use of the task force idea has been a step in that direction.

5. The Office of State Technical Services should consider using punch-card forms for receiving rate-use and other data. Key-punched cards could speed statistical reporting of program results at both state and federal levels.

In summary, there is an active program in Pennsylvania operating under the State Technical Services Act. Numerous projects of interest and benefit to business and industry are being conducted by various qualified institutions under the auspices of PENNTAP. However, if this service to the business and industrial community is to be continued and/or expanded financial support from the federal government is necessary.

Senator SCOTT. Dr. Arthur S. Adams. Dr. Adams is consultant to the president of the University of New Hampshire and represents the National Association of State Universities and Land Grant Colleges.

We welcome you, Dr. Adams. Would you be good enough to give us, for the record, the names of your associates and their connections?

Dr. ADAMS. Yes, sir. My associates are, on my right, Dr. Brice Ratchford, the vice president of the University of Missouri; and Vice President Robert N. Faiman of the University of New Hampshire; and Dean William L. Turner, the administrative dean for university extension at North Carolina State University at Raleigh.

STATEMENT OF DR. ARTHUR S. ADAMS, CONSULTANT TO THE PRESIDENT, UNIVERSITY OF NEW HAMPSHIRE, REPRESENTING THE NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND GRANT COLLEGES, WASHINGTON, D.C., ACCOMPANIED BY DR. C. BRICE RATCHFORD, VICE PRESIDENT, UNIVERSITY OF MISSOURI, DR. ROBERT N. FAIMAN, VICE PRESIDENT, UNIVERSITY OF NEW HAMPSHIRE, AND DR. WILLIAM I. TURNER, ADMINISTRATIVE DEAN, UNIVERSITY EXTENSION, NORTH CAROLINA STATE UNIVERSITY

Dr. ADAMS. The association for which I speak today has a membership of 99 institutions which grant more than one-fourth of the bachelor's degrees, and award almost 60 percent of the doctoral degrees in the United States.

But far more germane to this discussion is the fact that these institutions have had and continue to have the opportunity and the responsibility of providing broad educational opportunities to the people generally through extension courses and the seminars, conferences and institutes which are included in the term "continuing education." While many public and private institutions of higher education have effective extension or continuing education programs, a major share of work in this field is performed by our institutions.

This, of course, could be expected because it was in the act which started these institutions. The Morrill Act of 1862 indicated that the institutions were to have the responsibility of giving theoretical and practical instruction in the agriculture and mechanic arts. As you well know, the cooperative program in agriculture extension has been in operation for many years. And it has resulted in the increase in the production of food and fiber in the United States by manyfold.

Now, how is this worked? And at the risk of reciting the obvious, I would just like to touch upon the particular way in which it operates.

First, resident instruction provides the educational opportunity to develop qualified research workers in the agricultural sciences. Then, through the activities of agricultural experiment stations, established at land-grant institutions, many of these research workers address themselves to the questions of improving both quality and quantity of agricultural products.

And, finally, and most importantly, the cooperative agricultural extension program provides the workers, supported by local, State, and Federal funds, who undertake to help the farmer to apply in his daily activities, the advances in knowledge and techniques resulting from the research done at the experiment stations.

In the light of the fact that the original Morrill Act of 1862 specifically identified the mechanic arts as an area of concern parallel

to that of agriculture, it is not surprising that there has been a long history of interest and activity at land-grant institutions in today's mechanic arts, that is, engineering and technology.

I digress to give you a rather amusing note. I lectured on the land-grant philosophy in Europe at one time and kept talking about the Morrill Act and finally a German student spoke up and said: "I don't quite understand this Morrill Act. Does it have ethical implications?"

Until the enactment of the State Technical Services Act, there was only limited opportunity open to small business and manufacturing concerns for communication and participation in new developments along the lines that the Cooperative Extension Services had proved to be so effective in agriculture.

Most of our institutions have good to strong public service programs which usually take the form of continuing education courses and problem solving units. All of our institutions have programs with business and industry; but because of limited institutional funds in many institutions, extension work with businessmen and industrialists usually has had to be largely self-supporting, with the cost being paid by fees for the service. While the participants in these programs have undeniably benefited, they also have tended to come from those organizations which are large, progressive, and prosperous. From the standpoint of society, this group of individuals needs continuing education less than a very large number of smaller business and manufacturing firms who generally have not participated because of a lack of money to do so. The existing programs are based on willingness and ability to pay for continuing education and have tended to curtail the contribution to greater productivity which the many smaller concerns might have made if they had had access to technical knowledge relevant to their needs.

While a few universities have received substantial support from State government for such extension work, this has almost invariably resulted from vigorous efforts by enlightened and influential businessmen at the State level. These instances were used as illustrations of what could be done in testimony which was presented when the act was first being considered by the Congress. The State Technical Services Act, new and funded at a low level, has already begun to help small business and industry in many other States to achieve the same sort of results.

A number of studies have been made on encouraging innovation and the utilization of new technological ideas, all of which show that the pattern of putting knowledge to work is the same in agriculture, business, manufacturing, education, and all other fields.

Generally, there is a small percentage of decisionmaking units which consciously seeks out new developments and finds ways to apply them to the improvement of current practices. But a very determined and conscious educational effort must be made to get the majority of the decisionmaking units to become acquainted with new methods, ideas, and processes and to put them into operation. It is precisely through the service which the State Technical Services Act provides that this effort can be made most effectively. From the standpoint of the national interest, reasons for the act which were considered and endorsed by the Congress 3 years ago when first considered, are more cogent today for the simple reason that experience has proved them to be sound.

State technical services programs have been in operation only 2 years and at low level of funding, yet many useful results are already evident. Attached are selected examples from a few States of benefits which have accrued to business and industry and to the total economy. Many more such examples could be supplied and it is evident that the cost-benefit ratios are decidedly favorable. However, since educational programs are essentially long range in nature, even better results are to be expected in the years ahead.

The program has brought about significant and beneficial changes within the universities; beneficial, that is, to society at large. A survey of our member institutions indicated that most of our members have enthusiastically accepted the commitment implied in the State Technical Services Act.

There are six points here which I wish to underscore.

1. There has been a substantial increase in continuing education activities with business and industry.

2. There has been much innovation exemplified by universities employing field service personnel, mentioned earlier, for reaching the hard to reach and establishing central reference systems and information programs which provide new information through systems which previously could not have been afforded.

3. There has been a heartening increase in cooperation between public institutions and private institutions.

4. There has been increased productivity, communication, and partnership between State governments and universities. As one notable result, the requirement of State or private matching funds has not proved to be a major problem.

5. There has been the recognition by universities that successful prosecution of this program requires a team of specialists representing a number of disciplines. Universities have been able to mount such teams and they report a valuable carryover of the team effort into other fields as well as back into the classrooms on campus. The program has resulted in increased capabilities and motivation of universities to assist business and industry much greater than one could reasonably expect from the investment of the modest amount of funds that have been available.

And my sixth point is in relation to a point which you mentioned, Mr. Chairman, in speaking with other witnesses. That is, it has to do with regional work.

One new development in the State Technical Services program which I believe deserves special mention has taken place in New England. In this case, a regional approach to State technical services has occurred similar to that which I understand was proposed when the Congress first considered the legislation. With the support of the New England Governors Conference, and after 2 years of dedicated and, I might add, tremendous effort by many individuals, the New England Technical Services Board has been organized and on February 27 of this year transmitted to the Department of Commerce its first regional program.

As was stated by the chairman of the board, Mr. Erskine N. White, Jr., executive vice president of Gorham, a recently acquired division of Textron, in his presentation to the public evaluation committee meeting in Wilkes-Barre, Pa., the committee of which Mr. Elliott is the chairman:

Let us acknowledge that there were not only complications, but readymade obstacles to the regional idea. We needed the positive direction—and later the support, the understanding, and the patience—of our governors.

Yet the problems were solved and the obstacles were overcome, with the result that the regional plan is in operation with financial support provided by specially approved funds from each of the six separate States. The necessity for such a complicated procedure for funding arises from the fact that, quoting Mr. White again:

Presently six separate contracts are required to fund or commit for our regional effort. With the help of the State technical services office in Washington—and with your help—

Remember Mr. White is speaking to the public evaluation committee—

if legislative revision be required—we look to the time when the regional mechanism may itself be designated and authorized to act on behalf of the region—perhaps initially as a seventh agency in a six-State area, but with longer range though less precise vision, perhaps as the agency within the region.

The enthusiasm and sense of commitment to the regional idea by all of those who have been involved in this effort cannot be better expressed than did Mr. White when he said, and again I quote:

In conclusion may I say that we are proud of what we have achieved—not because the dollars of program generated, or even the economics of program-to-administrative costs, are that impressive—not at all; in fact, given a quick glance they might even be cause for question. Rather, we feel—we are convinced—that for the purposes of the State Technical Services Act we have, out of our many hours of effort, and out of our many instances of frustration and even, in times past, conflict—out of all of this, we have come to believe unanimously that we have built new meaning into the act itself and added a new order of magnitude to the effectiveness of our individual State programs. Far from being satisfied, however—or even tired—we feel we are just now at a beginning; we are convinced that, given the opportunity to continue, State Technical Services in New England can and will show increasing and impressive results in practical regionalism.

Questions have been raised by a few as to why the universities should be involved in a program such as State technical services. Why should the activities not be conducted directly by a Federal agency or by private associations? The clear answer is that universities approach their clients with objectivity and with no material benefit to gain. Further, they know educational techniques and have resources in specialists in many professional and academic fields, strong libraries, versatile computers, and well-equipped laboratories. These can be drawn upon as needed for special assignments with a particular business or industry. It would be extremely costly, and certainly uneconomic, for any other agency to try to duplicate this reservoir of capability.

And let me add, Mr. Chairman, that again the answer to this question is the same as the answer to the question having to do with the cooperative agricultural extension program which serves the same purpose.

While our association strongly favors the State Technical Services Act, we would urge amendments to the proposed extension. First, we feel that the act should be extended for an indefinite period and at the very least for 5 years. A long-range commitment is needed to enable universities to tool up—establish the basic staffing and programming—to perform the job at the level needed and to provide the consistent followthrough which is essential to enduring effectiveness.

Secondly, we would propose a funding authorization of:

\$18 million for fiscal year 1969;

\$30 million for fiscal year 1970;

\$42 million for fiscal year 1971 and succeeding years.

These figures are not drawn out of the air; they are based upon careful and extensive study on what is needed to do the job and upon the rate at which capabilities can be developed.

Also, at the time our association testified on behalf of the State Technical Services Act 3 years ago, it was with strong conviction that the act should provide not only for the dissemination of technological developments but also should make possible similar programs dealing with the science of management. We believe the act permits this interpretation, but in order to clarify the point, we would urge that the Congress, without amending the act, would state its sense that the managerial sciences are included within the scope of the program. This is critical because it is management which must make the decisions which bring about the adoption of new technology and the application of new technological developments. Therefore, it seems to us to be altogether logical that the program should be concerned as well with the processes of management as with the technology with which management has to deal. If the Congress, however, feels that clarification requires amendment to establish this end, we would endorse and support this action.

Finally, and especially in view of the New England experience with a regional approach as cited above, we urge that the legislation be amended specifically to authorize increased and more direct funding for regional programs. This may be accomplished through additional special merit funding or through increased Federal support of regional programs with more than 50 percent matching as an incentive to regionalism. In any event, we recommend strongly that it may be made possible for regional arrangements to be funded directly, subject only to the approval of the several State agencies participating in the regional plan.

I think you can agree, Mr. Chairman, that having to execute six separate compacts in order to have a regional plan is a rather clumsy way of going at it.

We thank you for the privilege of appearing before you today. We feel that the accomplishments and effects of the State Technical Services Act have been most encouraging. We are ready and eager to continue; we respectfully ask that you make it possible for us to do so.

Senator SCOTT. Thank you very much, Dr. Adams. I must say that, as one member of the committee, I agree with you on the regional approach, having already commented on the difficulty of interstate compacts.

I would like to see this. One of our problems is that in the somewhat volatile situation, where we do not know whether the future Federal planning will comprise an extension of military expenditures or not, that the departments have not requested a substantial change in the law. I think this committee ought to consider whether or not we can propose the inclusion of regional compacts. If we think we can do it without interfering with the appropriative authority and appropriative processes, perhaps it would be well to do so.

I do believe the committee can certainly include—and I will recommend to them that they include in the committee report the sense of the Congress—the suggestion which you have thoughtfully made here.

You have indicated your suggestion as to how we can improve the administration of the act.

Dr. ADAMS. Yes, sir.

Senator SCOTT. I would like to ask a question that I have asked other witnesses, to get your reaction to it.

Your statement indicates a desire to see the State Technical Services Act broadened, either by amendment or interpretation, to include specifically programs dealing with management sciences. Do you see any problem with this and the act's stated prohibition against the duplication of services "readily available in the States from private technical services, professional consultants, or private institutions." I have in mind particularly the number of professional consultants and private institutions already in the management field. What is your reaction to this? How do you feel?

Dr. ADAMS. An earlier witness, Mr. Chairman, indicated that there was concern among the professional engineers that the enactment of the State Technical Services Act would affect adversely private consulting firms. It strikes me that the experience which now justifies the Association of Professional Engineers to support the act, indicates likewise that there would be no interference. There are enough stipulations in the act itself to preclude the possibility of any interference with the efforts of private agencies.

I would like to call on Dr. Faiman for further comment on this point.

Senator SCOTT. Yes. Before you go ahead, Doctor, I would like to mention that Senator Cotton was here for a part of the proceedings. The full committee is engaged in some very vigorous debate on another matter, and he regrets very much that he has to go back. He is, at times back there, the spokesman for one of two points of view on this matter.

Dr. ADAMS. And I am sure an eloquent one.

Senator SCOTT. He is always eloquent and, with me, a persuasive spokesman.

Go right ahead.

Dr. FAIMAN. Mr. Chairman, three of the gentlemen sitting here at the table have had the privilege of being associated with the development of the State Technical Services Act since, I guess you might describe it, it was initially a gleam in Secretary Hollomon's eye many years ago. Never, at any time in any of our discussions, was there any feeling on our part that administrative sciences, managerial sciences, and the problems of management could in any way be divorced from the effective utilization of effective technological information. Words mean different things to different people, but in reading the testimony and in reading the act itself, we have vigorously dissented from the interpretation of the administration's legal end of the Department of Commerce. So my remarks are obviously a bit biased.

Senator SCOTT. Well, Mr. Ellert is present and he is listening.

Dr. FAIMAN. However, I would simply say I believe the recent ruling of the direct causal relationship is an improvement, and it is an improvement over some of the previous interpretations. I think I would speak for our group in saying that we do not believe it is still

a sufficiently liberal interpretation in the sense that we would urge that it be clearly stated, either by correction of congressional intent or actually changing the legislation, that management sciences are an integral and necessary part of the effective utilization of technological information on modern American industry, business, and commerce.

Dr. RATCHFORD. Could I add a comment? I am Brice Ratchford of the University of Missouri. And Dr. Faiman and I were two of the ones called together by the Department of Commerce to help develop this. I would like to comment on how liberalized is this new interpretation.

As an operating head of one of these programs, if the Department of Commerce approves it, I have to certify—and they are very good about accepting my certification—that there is a direct causal relation. Well, of all of the things I have to look at and make a judgment on—how can you accept these—yes, I think so because I know that management is wrapped up in it.

But when they get to pushing you back and I get the word when an auditor comes in, “Now, what was the exact causal relation here,” it is from the standpoint of the Department of Commerce, it is probably satisfactory. But for those of us who have to mention certifications and say, “Yes, there is a one-to-one relationship,” I think you can see that is an obvious problem here.

Senator SCOTT. You don't like to be caught in a semantic discourse on the meaning of words with someone whose main job is to consider the meaning of money. Isn't that the problem?

Dr. RATCHFORD. That is right. Our associations are not thinking of the whole field of management. We are not thinking of teaching accounting or these sorts of things, but at least have the flexibility to work with management on establishing systems, getting the tools, tying in computers, et cetera, that will enable them to evaluate whether in fact a piece of technology will enhance their opportunity.

Senator SCOTT. Could you give us an example where some proposal has been turned down because of failure to comply with the interpretations as to the limitations of the act?

Dr. RATCHFORD. Well, going back to my own State, we proposed a number of short courses, or noncredit courses, that were directed to improving the decisionmaking ability of management and including the communications within the structure, which is part of it. These were ruled out because nobody could say that there was a direct causal relation between this and the adoption of some particular type of technology.

Senator SCOTT. Thank you, Dr. Ratchford.

Dr. FAIMAN. Mr. Chairman, if I could perhaps present this from another point of view—there is a concern, and I think a very real one, that under this act, certain very elementary, very simple things such as accounting, one I think that the Department had considerable difficulty with, and I see that it should have, is one that came out as speed reading for executives, or something of this sort. Obviously we are not interested in that sort of thing. We are talking here about the professional dimensions of the managerial process.

I think the analogy is the State Technical Services Act is not directly concerned with the technical training.

Senator SCOTT. What about the training of executives in computer techniques?

Dr. FAIMAN. This, fortunately, is one that has been accepted.

Dr. RATCHFORD. They included that.

Dr. FAIMAN. Because, you see, there is a technological content to this. So we can swing it around in that way. In fact, we have just had a very successful program of this kind.

We propose, and strongly endorse, the avoidance of what one might call the purely low level technical dimension of this, at the same time emphasizing the system, the professional, high level decisionmaking process, the administrative technician whereby effective decisions can be made in terms of profit and loss, whether or not a new idea should be adopted or not adopted. This, at least in my estimation, is the managerial sciences we are talking about.

Senator SCOTT. All right. The fourth gentleman?

Dr. TURNER. Thank you, Mr. Chairman. I have got two points. Earlier Dr. Adams mentioned broadening the increase and cooperation and coordination at the State level between both public and private institutions.

I would like to say that we have a very unique situation in the State of North Carolina on State coordinatings with the State-designated agencies of North Carolina in the Department of Administration. Within our program we have an everexisting agency in both the State agency and nonprofit research institute, and both public and private colleges and universities. I think this has done a great deal to increase the effective coordination and cooperation in putting together a joint effort and a joint program for State technical services at a State level.

I might just mention this example a little more specifically. A land grant institution at North Carolina State University, a State University, East Carolina University, Wake Forest University, private university, and Duke University is coming into the program this coming year and a State agency which is acceptable under the rules and regulations, the Board of Science and Technology, and a nonprofit research institute, the Research Triangle Institute.

So we have all the different organizations at State level and colleges and universities, both public and private, represented in our program, which is going forward with a frontal attack on this program.

The second comment that I would like to make, in addition to appearing with the land-grant contingent here today, I am also representing the National University Extension Association, and this association represents some 133 colleges and universities nationwide, both public and private, who are extremely interested in areas of continuing education and extention.

We wish to go on record and express the support of the National University Extension Association on behalf of the State Technical Services Act.

Senator SCOTT. Thank you very much, sir.

Dr. RATCHFORD. Could I add one word?

Senator SCOTT. Yes; please, Dr. Ratchford.

Dr. RATCHFORD. The only specific proposed changes, in the bill before you, we have is lengthening the extension as far as you can. It calls for a 2-year extension. I will just take a minute to say why I think this is important.

Senator SCOTT. Yes.

Dr. RATCHFORD. It has been documented in countless documents where the main failure for universities in their extension programs or continuing education programs is lack of continuity. You get started and then you are out, and it is all just a material failure.

Senator SCOTT. And the competition in the academic community is such that, if you can't offer a program of some length, you obviously run into difficulties in getting the personnel that is needed.

Dr. RATCHFORD. This is the second point I wanted to make. Everybody at the university is busy, so you had to recruit additional staff. Now, granted you may have taken an additional faculty member and put him on this program, but then somebody had to be recruited to fill his shoes. So you had a recruitment problem. It takes high level people to do this. They are scarce, as everyone knows. They aren't looking for a job. You have to look for them and really do "a courting job"—to use a term they use in Missouri—to get them. And anything—such as some question about how permanent is this, how long is it going to last, et cetera—just is the worst detriment we hit to recruiting the sort of people we need. So we would urge a longer authorization, as long an authorization as you can. We recognize it will be a fiscal situation, et cetera, but we are—

Senator SCOTT. Thank you very much, gentlemen.

Dr. RATCHFORD. Thank you.

Senator SCOTT. We will include in the record a letter from Charles E. Odegaard, the president of the University of Washington.

(The document follows:)

UNIVERSITY OF WASHINGTON,
Seattle, Wash., April 12, 1968.

HON. WARREN G. MAGNUSON,
Senate Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: The State Technical Services Act expires on June 30, 1968. The Department of Commerce has asked for only a two-year extension with a funding authorization of \$7,000,000 annually. This proposal is embodied in Senate Bill S-3245.

The National Association of Land-Grant Colleges and State Universities has reviewed the experience in many states under this Act. The public institutions have been particularly active in using its assistance to benefit economic developments in their states. Public and private institutions of Washington have played an active part in providing educational services and my associates and I are convinced of the desirability of continuing this legislation and this program. I hope that as chairman of the Senate Committee on Commerce you will have an opportunity to hold hearings on this bill. I also wanted you to know that we think it a very useful piece of federal legislation and hope that it will be reenacted for a five-year period.

With best personal regards,
Sincerely yours,

CHARLES E. ODEGAARD, *President.*

Senator SCOTT. Dr. John E. Means, program coordinator, Washington State technical services program of the Department of Commerce and Economic Development, Olympia, Wash.

We have already included, Dr. Means, in the record, a letter from Dr. Charles Odegaard, the president of the University of Washington, in support of the program. So will you just proceed in your own way.

STATEMENT OF DR. JOHN E. MEANS, PROGRAM COORDINATOR,
WASHINGTON STATE TECHNICAL SERVICES PROGRAM, DEPART-
MENT OF COMMERCE AND ECONOMIC DEVELOPMENT, OLYMPIA,
WASH.

Dr. MEANS. All right, fine. Thank you.

Senator SCOTT. We are trying to finish this morning. And I am sorry that we have had to delay some of the witnesses, but we are nearing the end.

Dr. MEANS. Mr. Chairman and members of the committee, my name is John E. Means. I am program coordinator for the State of Washington technical services program and a staff member of the department of commerce and economic development.

I am appearing to testify on the program conducted by the State of Washington with particular reference to the expressed interest of industrial concerns for information on business administration and management.

At the outset of planning the State technical services program for Washington State, it was realized that in order to meet the objectives of the act a basic prerequisite would be to determine those categories of technology which were of interest to our industries. Since no such information was in existence, the department of commerce and economic development conducted a statewide survey of all potential users to determine their particular field of interest.

This was done by mailing a questionnaire to all business firms of record in 26 standard industrial classifications covering mining, manufacturing, communications, utilities, and assorted services. From a total of 6,000 questionnaires that were mailed, about 4,000 responses were received. From these responses, a registry has been developed of about 2,700 firms who wish to receive technical and scientific information.

The registry at this time includes 287 categories of technology. Abstracts of government documents or other technical literature are mailed to industrial firms in the State that pertain to those specific categories in which they have expressed an interest.

Business administration and management is listed as a major category of interest, with eight subcategories that can be included in the program under the present Technical Services Act. The number of firms currently registered to receive any one of these categories of information is 1,427.

Of these 1,427 firms, the numbers registered for each subcategory are as follows:

- (1) Automation, 572;
- (2) Cost effectiveness, 805;
- (3) Management control, 866;
- (4) Production control, 759;
- (5) Property management, 532;
- (6) Quality control, 642;
- (7) Records management, 785; and
- (8) Warehousing and storage, 569.

It is interesting to note that even though business administration is a common factor to all business, that about 1,300 firms were not interested in receiving information on business administration.

However, all the firms were interested in receiving information on some categories of science and technology relative to their industries.

In the initial 3 years of the Washington State program under the act, five of our universities have participated in conducting seminars, short courses, and demonstrations. A total of 39 such projects have been approved by the OSTs, and have either been completed or will be conducted by the end of the 1968 program. Of these projects, 11 were directed toward management sciences that relate to technological developments.

These types of short courses encompassed computer simulation and control techniques for management and their application to industries involved. They included automatic and numerical control techniques, PERT and CPM programming, inventory, and queuing theory and models, as well as other subjects related to scientific management techniques. Typical examples are the short courses on forest management and wood technology conducted by the University of Washington on such subjects as "Network Analysis for Forestry Planning" and "Planning and Scheduling in Forest Products Industry."

Also the "Development Conference for Industry Managers," conducted by Washington State University, and the course on "Data Processing Applied to Management Science" at Eastern Washington State University, are examples of the types of courses of applied business management that are now conducted under the present act.

Senator SCOTT. May I interrupt there to say that that is precisely the same kind of program which I have proposed in a bill in the Congress, that we consider in certain Federal agencies the application of data processing to the science of government.

And I don't mean to draw you into a discussion, but we are very much interested down here in that same sort of a program.

Dr. MEANS. That particular program had over 110 leaders from small industries attend, and they were quite enthusiastic at the results they were able to get on data processing.

The Technical Services program meets a particular need in Washington, where we have a few very large companies with very advanced technologies and a very large number, about 3,000, of small firms with extremely limited technical resources. These small firms have an extremely diverse range of technological requirements, as shown by the attached chart.

Standard industrial classification		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
		Aeronautics and space technology	Agriculture	Biomedical and medical sciences	Business Ad. and Management	Chemical industry	Chemistry	Earth sciences	Electronic/electrical industries	Engineering technology	Fishing industry	Foods and food processes	Forestry and forest management	Materials	Mathematics	Metals industry	Mining industry	Municipal engineering	Navigation and detection	Nuclear technology	Physics	Printing/photo/graphic	Pulp/paper industry	Textile industry	Wood products industry	
20	Food and kindred products	9	128	40	196	53	11	39	27	91	64	319	7	31	18	19	6	44	7	4	15	23	22	4	12	
22	Textile mill products		1		5					1	4	2		7	2	3				4	6	3	60	7		
23	Apparel		3	1	25	6	1	4	2	5	4	2	10	2	2	3				1	30	28	3	6	3	
24	Lumber and Wood	14	75	11	184	48	11	51	37	116	23	31	235	78	19	56	39	27	13	8	3	28	65	14	331	
25	Furniture and fixtures	2	4	2	32	8	6	6	15	3	3	20	1	10	1	4				2	1	8	30	1	37	
26	Paper and allied products	1	8	2	25	12	4	10	9	12	3	5	4	11	3	4	2	5	1	2	5	18	30	1	7	
27	Printing, Publications and Allied Industries	9	26	10	112	17	2	34	29	27	12	11	23	28	10	9	15	17	10	7	19	281	72	7	21	
28	Chemicals and allied products	5	25	12	46	68	31	23	8	27	9	14	6	34	3	16	10	10	3	5	9	10	15	6	23	
29	Petroroleum refining industries	5	2		9	10	1	10	4	9		1	3	11	3	3	3	2	1	4	4	2	4	1	4	
30	Rubber and miscellaneous plastics	5	4	2	12	25	2	3		12	6	3	1	27	5	1	1	6	2	2	3	5	7		4	
31	Leather products	2	26	4	57	21	2	23	9	45	2	5	4	45	4	13	23	28	1	4	11	6	3	2	14	
32	Stone, clay, glass	2	26	4	26	8	2	14	7	24	3	1	32	4	4	43	3	3	2	2	6	3	1		11	
33	Smelting, refining and casting	16	32	7	93	46	5	26	16	107	25	26	14	91	6	152	13	18	7	7	27	20	20	5	36	
34	Fabricated metal products	36	48	9	98	41	3	28	44	142	25	31	34	96	8	136	10	11	7	4	42	23	31	7	39	
35	Machinery, except electrical	9	1	4	33	16	3	12	40	28	6	5	2	25	5	25	2	4	14	4	21	16	5		7	
36	Electrical machinery, equipment, and supplies	27	9	4	58	34	3	13	19	58	38	10	5	59	3	47	5	8	11	5	12	6	1	2	37	
37	Transportation equipment	4	2	12	10	11	2	6	9	13	5	4	2	17		10	2	2	7	4	12	5	2	1	3	
38	Professional sciences, cont. Instruments	2	4	2	41	33			10	20	5	1	46			42	3	1	1	1	5	18	2	1	6	
39	Miscellaneous manufacturing industries	10	17	5	48	5	0	7	76	20	8	10	9	11	8	11	3	10	10	4	19	20	2	3	12	
48	Communication	3	12	1	24	11	2	14	15	34	1	3	1	8	3	4	3	48	1	5	5	5	1	1	5	
49	Electric, gas, and sanitation services	18	44	22	138	45	12	45	61	79	24	47	25	48	22	36	20	34	23	10	32	70	25	18	52	
739	Business services, n.e.c.																									
862	Professional membership organizations																									
891	Engineering and Architectural services	20	59	33	128	67	5	170	80	203	37	48	40	94	25	36	42	156	25	31	91	99	36	10	144	

It has been shown in previous hearings that technology is best transferred by a person-to-person contact between the user and the researcher. Our problem has been how to bring that contact about.

Various techniques are being experimented with and are having some success. For example, the University of Washington Institute of Forest Products held a seminar on forest fertilization. This subject is of great economic importance to the Northwest on which research has been conducted for 25 years.

However, this seminar, sponsored by the State Technical Services, was the first time that the researchers in the field and the majority of the people interested in forest management and people in the fertilizer industry ever met to have a face-to-face discussion of the opportunities for individual applications of this research.

The results were so beneficial, with such a large attendance, that the University of Washington has now under consideration a plan to conduct additional seminars on this subject without further funding from State Technical Services.

Washington State University is likewise experimenting with field visitation techniques whereby a group of technologists on one particular subject will visit the firm for a roundtable discussion. The latest technical information is discussed and the company's problems are reviewed. Dr. George Marra is conducting this work without funding from the STS in an effort to find a technique of reaching the small firms that are unable to send individuals to seminars or conferences.

Examples of the efforts of the other universities could be cited. In general, however, the effect of the State technical services program has been to assist the universities to initiate programs which can be continued without further funding once their value to both business and the university has been demonstrated.

I want to thank you for the privilege of attending this morning. If there are any questions, I will be glad to answer them.

Senator SCOTT. Well, I appreciate your being here very much, and the fact that we don't ask any questions is principally because I think we have already covered the major points of concern.

But I think, in summarizing, you would agree, would you not, that the program is successful and is well administered and serves a most useful purpose? I don't want to put words in your mouth, but I think that is the summation of your statement; is it not?

Dr. MEANS. We do agree; yes.

Senator SCOTT. Thank you very much.

Mr. Ross Renninger, Mr. Renninger, may I express my pleasure that you are here?

Mr. Renninger is assistant to the vice president of manufacturing of the Textile Machine Works, Reading, Pa.

STATEMENT OF ROSS G. RENNINGER, ASSISTANT TO THE VICE PRESIDENT OF MANUFACTURING, TEXTILE MACHINE WORKS, READING, PA.

Mr. RENNINGER. Senator Scott, it is a great privilege and pleasure for me this morning to appear before you in support of this bill, not only in support of it but in support of the amplification and continuation of said bill.

Industrial organizations of every size have a continuing need for easy and fast access to the most up-to-date and accurate information obtainable. It therefore follows that the libraries of our larger universities would possess such information within the university complex; however, the reconnoitering necessary to properly evaluate the multiplicity of sources available becomes an impossible task unless someone is explicitly assigned such a responsibility and becomes skilled in this particular field.

Most of the companies with 1,000 or more employees have their own source of information, usually a library within their own system, but there are still many problems arising out of today's advanced state of technology that even companies of this size find it to be quite a hardship to even begin to purchase and have immediately available more than a token amount of pertinent information.

The first real concerted effort within the scope of my knowledge was that inaugurated by the State Technical Services Act, wherein a minimal amount of funds may be used to gain maximum return through the orderly retrieval of stored knowledge quickly available to people requiring such information.

The alternate would be for several companies to group their resources and staff a library center so whatever questions were raised could at least be answered with some dispatch and authenticity, but even this approach could only be classified as a token effort, since at times it would require a staff of many times its authorized size, and at other times the information sought would not be available.

It has been estimated that most technical books containing wealths of information are actually in use; that is, withdrawn from their designated position on the library shelf, less than 3 percent of the time they are available. Even if this estimate was 500 percent in error, it certainly does not make any sense to keep to the present mode of operation when really all it takes is to have a person or group of people assigned the searching task, and the usage figure would increase manifold.

It is likewise no secret that advances in all technological fields have moved at such a prodigious rate that since the termination of World War II we have completely eclipsed the amount of progress experienced since the beginning of time. It therefore becomes even more necessary that valuable time and skill are not wasted in working out the answers to problems that have already been solved.

It is indeed an excellent possibility that once we know how to ask our questions in a uniform, concise manner that the State program could be turned into a national system and by use of data processing equipment, coupled with a data phone hookup, we would be able to avail ourselves of the best information contained in a pool composed of every major library in the country. This would be a tremendous advancement, and since the present system started with the initial passage of the subject bill, we could well be considered to be on the threshold of this more sophisticated approach.

The current allocations are excellent, but to cover the States as they should be covered, it would require a more drastic effort and concentrations of both time and money, and even if it were to be stepped up to several times the proposed rate, it would still only represent a cost exceptionally small in monetary sums per employee affected. I believe there are very few, if any, programs that can prove the amount of

tangible returns in good solid figures that the State Technical Services Act has done to date, and as I have outlined before, it is only the beginning.

If our country is to maintain the position it has enjoyed in the world to date, relative to new products, ideas, inventions, patents, and just good thinking capacity, we must find a means of getting to the facts quickly so prudent and wise decisions may be made.

Here at the Textile Machine Works in Reading, Pa., we have celebrated our first 75 years of progress in 1967, and all of us are very proud to be associated with such a dynamic organization. Even though we have over 4,000 employees, including a large amount of engineering talent, it is totally impossible for us to even scrape the surface of the knowledge bank that is available, since our product lines range from (a) the smallest hypodermic or knitting needle to large complex machines weighing many tons and up to 60 feet in length, and (b) high-production lines producing castings to the machining of parts to close tolerances from exotic metals.

We have made excellent use of the Penntap program, as the result of the act is known in the Commonwealth of Pennsylvania. I have personally requested assistance on many occasions, and in at least 80 percent of the situations I received excellent information that has saved my company many dollars and much valuable time.

Originally, when the program was broached to me, I had many reservations because through many years of exposure in this field I came to believe that any information that was given for free was only worth as much. However, my first question to Penntap proved that this conception was incorrect.

I share the opinion with many others that have been exposed to the program in that the one weak link in the whole system is its public relations aspect. What I mean is, there are so few dollars available to implement the program that there is nothing left to publicize its points.

The university has prepared many 5-minute tapes called "The Sound of Progress," and these are distributed weekly to all of the radio stations cooperating with the program to be aired whenever time is available. However, since it is a gratis situation they are usually put on at 1 a.m. or at some other time not too appropriate or conducive to getting the ear of those people who should know about Penntap.

Here in Berks County we use the various house organs, newsletters, or any other free means of getting to the people, except it is my candid opinion that 60 percent of the people who could make good use of the program either know nothing about it or only possess a smattering of what it is all about.

CONCLUSION

1. I believe the program has done a great deal of good in letting the average person have a means of acquiring the information available within the walls of our technical libraries.

2. All the funds that have been appropriated to date and assigned to my State have had excellent use made of them. Administrative expense and other costs not directly involved in the release of information has been maintained at an all-time low.

3. Funds should be made available so at least an effort could be shown in the direction of public relations.

4. Expansion to cover all the 67 counties in the State of Pennsylvania should be made, even if we reached some of the less populated areas or those not requiring the full-time services of Penntap with a traveling bookmobile to get the information out.

Unfortunately, unless people know what is available, they would have difficulty ascertaining the degree of acceptance they might have. I think everyone connected with the program is most grateful for the assistance given by the Federal Government, but to really put it where it belongs, strong consideration should be directed to an automated national system for maximum benefits.

Senator SCOTT. Thank you very much, sir. I would like to ask you, Mr. Renninger, if you would elaborate on your position that you just mentioned, that the public relations aspect of the State Technical Services Act should be strengthened.

Mr. RENNINGER. What I mean, sir, is that we should use a program, or use a system to let more people know that it is available, to let more people know what it is all about.

The method by which I was introduced to the system was not by way of news media. I think that a great deal can be done in this area, and I think it should be done uniformly and not just a haphazard, as-available, as-thought-of approach.

Senator SCOTT. Would you recommend that that be done through the State programs? In other words, do you feel that the improvement of the public relations aspect can best be done through Federal activity, or at the State level? Or both? Or just how do you go about that? How would you go about improving, it beyond what you have said?

Mr. RENNINGER. I think a general format should be established on a Federal basis. The unfortunate part about leaving it stateside would be a redundant effort—there would be much duplication. I think there would be much experimentation going on at a time when other States were spending money in the same way.

It seems that a program should be agreed upon and tried uniformly across the States, as opposed to a competitive type of effort.

Senator SCOTT. I must admit I am sympathetic when you mentioned the fact that "The Sound of Progress" sometimes gets on in what the media call the "ghetto hours." It happens to my programs, too. [Laughter.]

Senator SCOTT. Do you have any further comments, Mr. Renninger?

Mr. RENNINGER. I have none, except just that I would like again to amplify that we are indeed grateful for the amount of good that we have gleaned from the program. We are fortunate in being the first county in the State of Pennsylvania to use the program.

I think I was one of the first individuals to make use of it, and we were able to get a bit of information out of the file that was about 25 or 30 years old, except unfortunately we didn't know anything about it and it did save us time and money on the very, very first one.

And there are many more examples, very similar to that. It is just a matter of getting to the information and getting the question put in such a way so that the librarian knows what you are after.

Senator SCOTT. We know on the State planning board there is a great deal of progressive activity and alertness in Berks County industries. And so I am delighted that we have you here as one of our witnesses.

Since there are no other requests from witnesses to testify, the record will be held open for a reasonable time for anyone who wishes to insert a statement. But there will be no need for a continuance of hearing, so far as we are now aware.

(The statement of Dr. Marra follows:)

STATEMENT OF DR. GEORGE G. MARRA, WASHINGTON STATE UNIVERSITY,
PULLMAN, WASH.

Since passage of the State Technical Services Act in 1965, state organizations have been established and programs have been initiated at a number of institutions to promote the dissemination of technical information to business and industry. This in itself may be labeled as significant progress toward the stated purposes of the Act, but the specific impact of the Act on economic growth is not likely to be measurable for many years.

Nevertheless, the encouragement of economic growth through dissemination of technical information continues to be a highly desirable objective and the Act should be continued with higher funding levels in order to accelerate the establishment of effective channels for this type of communication.

After three years of critically observing the operation of the Act at the university level, I have noted certain features of the overall problem, which if given proper attention could greatly enhance the possibilities for ultimate success. Five such problem areas are described below with the hope that additional wording in the Act may permit an expanded effort to cover the present shortcomings:

1. *Management.*—Any major benefits to be realized by a firm from the influx of new technical information depends upon the attitude and actions of management. The relevance of the State Technical Services Act to this area of concern has been widely debated since passage of the Act. The confusion results from the fact that the Act speaks to the dissemination of technical information while at the same time specifying that one of the criteria of a qualified institution under the Act is the existence of an accredited degree program in business administration. The latter indicates that subject matter related to management may be an appropriate concern under the State Technical Services Act despite the fact that it may not be technical in nature. I personally believe that this matter should be clarified in the Act in such a way as to emphasize the need for improving the atmosphere for technical innovation at this most critical point in the spectrum of commercial activity. Without this emphasis, the potential benefits from this Act will accrue disproportionately to those firms already knowledgeable in this area.

2. *Intellectual Level.*—The level of sophistication of technical information needed by some industries is below the intellectual level of professors normally associated with colleges and universities having accredited programs in science, engineering, and business administration. Consequently, there is a natural reluctance to be concerned with the dissemination of information which may be considered common knowledge and not usually involved in the mental activities of professors at such institutions. This is not intended to depreciate the value of such knowledge, but simply to point out that responsibility for its dissemination might be better placed. One possible remedy for this problem is to expand the list of qualified institutions to include community colleges whose course offerings provide expertise in areas of local industrial and business activity. Judgment of the qualifications of these institutions should reside with the designated agency rather than with the United States Commissioner of Education as now required in Section 2(c).

3. *Technical Capability.*—Many of the programs initiated under the State Technical Services Act thus far have catered to those industries and businesses having a rather high level of resident technical capability. Such firms are able to recognize their technical needs and are motivated to attend technical conferences, seminars, workshops and otherwise expend effort in seeking answers to problems. However, many firms which contribute to the economic stability of our country lack this technical capability or lack the motivation to seek assistance on problems. There appears to be little possibility of reaching these firms except through personal visits by experts competent in particular fields of technology. Service of this type, although necessarily individualized to a degree, would require some restraints in order to avoid connotations of competition with commercial consulting agencies. The latter should quickly recognize, however, that such firms are not now in the market for consulting services, but could become viable members of the economic community, and active seekers of consulting

services after proper stimulation by activities of the type proposed. Such effort is costly in terms of man-hours of input per firm served, and therefore if it is to be fostered as a means of upgrading this segment of the economy, special inducements must be provided to participating institutions in regard to the ratio of federal to matching funds.

4. *Experimental Programs.*—A category of experimental programs is needed in the Act, perhaps under Section 2, which will encourage the development of new techniques for disseminating technical information more in keeping with the requirements of industry as contrasted to those of universities. Such a program will look to the long-range objectives of the Act and will recognize that these cannot be achieved by means of an intermittent effort on the receiving end. It will be necessary, rather, to establish the concept of continuous searching and improvement of operations. This will require new methods of organizing technical information and feeding it directly to those in need at their place of employment at a time when they can be free to absorb it. In this connection, television offers enormous possibilities. However, these programs are very costly and require advance preparation of several years before they can be offered as a service. In addition, as experimental programs, there is always the possibility of failure. Such experimental programs therefore should be funded at a high level with minimum matching and should be encouraged above all other programs supported by the State Technical Services Act.

5. *Interpretive Effort.*—Some of the original impetus behind the State Technical Services Act was provided by the need to disseminate to the civilian sector of the economy the large volume of scientific and technical information accumulating as a result of massive government research programs. It was assumed that knowledge developed to solve a specific problem could also solve many other problems. However, technical information, once displaced from its point of origin, tends to become anonymous and abstract in character. This, together with its deadly volume, results in an insurmountable barrier for the average seeker of information. Consequently, if reuse of this information is to be encouraged, it must be subjected to an interpretive effort and repackaged with particular end uses in mind. For example, a scientific document prepared to solve a technical problem in the aerospace program would have one interpretation when applied to civilian aircraft manufacture and quite another when applied to wood manufacturing. While some of this type of interpretation takes place on whatever information enters the stream of professorial interest, this effort is far too small to be of significance at this time, particularly in regard to cross-stimulation of innovation among unlike industries.

It is suggested that this type of interpretive effort be encouraged by specific reference under Section 2(a) (1).

Senator SCOTT. The full committee will be asked to act on this as soon as reasonably possible. I hope that we can get prompt action on this legislation.

The committee will certainly be requested to bear in mind the many useful and informative suggestions that we have received.

I want to thank all the witnesses, and thank you particularly, Mr. Renninger. Excuse us for having been so long in calling you.

Mr. RENNINGER. It's perfectly all right. Thank you.

Senator SCOTT. The hearing is adjourned.

(Whereupon, at 12:25 p.m., the committee was adjourned.)

