FUNCTIONS OF THE OFFICE OF THE TECHNICAL SERVICES, DEPARTMENT OF COMMERCE

24 October 1950

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Mr. John C. Green was born in Washington, D. C., 2 March 1910. His education includes the B.S. degree from the U. S. Naval Academy, 1934, and the LL.B. degree from the Georgetown University Law School, 1940. He is a patent attorney. During World War II he was the chief engineer, National Inventors Council, examining and analyzing scientific inventions directed to the war effort in cooperation with the armed services. In 1945 he was appointed director, Office of Technical Services, Department of Commerce, and he was also in charge of scientific data acquired in Germany and Japan for general distribution. His present position is Director, Office of Technical Services, Department of Commerce.

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COLONEL DIEHL: All of you are aware by now of the manner in which scientific and technical information, information which is usually highly classified, is disseminated within the Department of Defense. This morning we shall hear how government data are released from security regulations and restrictions and made available for the public benefit and for maximum use by industry and business. The chief of the agency charged with this function will speak to us this morning on the subject, "Functions of the Office of the Technical Services, Department of Commerce."

Gentlemen, it is my pleasure at this time to present to you Mr. John C. Green.

MR. GREEN: Gentlemen, during a discussion at Ann Arbor a couple of weeks ago on the subject of research and Development Dr. Killian, of the Office of Naval Research, prefaced his remarks as follows: "If any of you expect to hear anything from me deprecating the sanctity of womanhood, the integrity of the Marine Corps, or the value of scientific research and development, you are going to be disappointed." I hasten to indorse his statement. However, there are certain obvious limitations in all three of these pillars of society; since I am only conversant with the last, I will restrict my remarks to research and development, particularly as it affects the industrial picture.

The Department of Commerce basically is directed to "foster and promote" industry in the United States. In the basic legislation of the Department there is a statement that we shall collect, compile, and supply information valuable to the manufacturing industries of the country.

This takes a variety of forms. As you know, we have economic data, statistical data, foreign trade data, marketing data, and a host of other different kinds of data. In the field of science and technology my office has been designated as the one to work with the industry people, particularly the smaller firms.

Now, the reasons we work with smaller firms are twofold. One, there is a political directive to exert efforts to aid small business. The other is that the smaller firm, which doesn't have its own research facilities and its library and trained engineers, is the one which is in most need of technology, particularly of an applied nature.

I don't want to give the impression that basic research isn't important in small business, but it is pretty obvious that small business can't afford it. Small business is interested in short-run, short-term operations. Naturally, its research activities are similar in character. It doesn't have the financing ability to afford long-term basic research with its less immediate benefits.

I hate to digress, but you know there is quite an argument as regards large business and small business. We have to admit that there are certain types of research that nobody but a large firm can afford; and, if the large firm doesn't do those kinds of research, they are not going to be done.

I have reference particularly to the type of research that was done in the development of nylon. The DuPont organization spent 23 million dollars and carried on several years of good fundamental research before its scientists even knew they had something. It was a gamble right up to that point. Who can expect a small firm to afford that kind of venture?

Frankly, many small businesses have profited from DuPont's work in nylon. I am not blowing the horn for DuPont; but, as you know, DuPont makes a material, and out of that material we get nylon tooth brushes, nylon shirts, nylon coats, and so on, which are small business products. So there is a very real area of research which none but the large can afford but which directly benefits the small. I have had a little trouble within our own department and elsewhere in trying to indicate that the fact that small business can't afford all areas and kinds of research is not necessarily a serious economic disadvantage.

Now, to get back to the organizational structure that we employ in the Department of Commerce: It is essentially pyramidal. At the apex of the pyramid we have a staff of engineers who represent the different specialties—chemistry, electronics, mechanics, and so forth. These men don't necessarily know all the answers to current questions of research and technology, but they know where the answers exist. It is their problem to find out how to help the small, the medium, and the large business concerns with their immediate, everyday problems. These people are supported by over 400 laboratories, research foundations, and university organizations that have agreed to cooperate with the Department in providing technical information and research assistance to the business community.

The way it actually works is something like this: There will be a small businessman, we will say, out in Minnesota who will visit one of the field offices of the Department. There are 42 of them around the country. He will indicate that he has a problem; that he is faced with a manufacturing difficulty. Possibly one of his competitors has come up with something new and improved, and he wants to improve his product. Or he may want to cure a manufacturing defect.

Our people in the field are trained to bring to bear the technical facilities in that area. They have contacts with the consulting engineers, the commercial laboratories, the university research activities, and like facilities. If there is someone in that area who is qualified to help that man, an arrangement is made to get them together. If not, the query usually comes back to us in Washington; and it is our job to collect the information, package it, and send it to that man.

We handle about 100,000 inquiries a year. About 40,000 of those require some degree of technical competence. About 2,000 of these really require serious research investigation, not in the sense of laboratory research, but in the sense of assigning a man to it as a project to provide the answer.

Sometimes we find that the answer doesn't exist. Here the answer will be found through research. Equally often we find that the answer already exists yet the man thinks he needs research. But, to get back to the first case, when the answer doesn't exist, we endeavor to stimulate that man, his trade association, or a cooperative group to hire research. I don't mean that the research should be done at a government laboratory, in fact this is generally undesirable. Where there is a competent private facility sympathetic and willing to work with this man, it should be recruited. We try to get research started by bringing the problems out and developing the need for their solution.

In working with the small business community particularly we find people have an exaggerated idea of how hard it is to do research and how much research costs. Therefore a lot of our problems are on the educational side. I suppose that is true everywhere, but with the small businessman particularly it is very difficult to get across the idea that the Federal Government can do anything for him. You have to move slowly and carefully in acquainting him with services and technology available. Finally, when they really come around to see it, they are most enthusiastic converts.

Let me digress again to tell you of a little example that we had. The plastic industry was moving into the hotel china field, and so was the glass industry. Naturally, the manufacturers of hotel china were quite distressed and thought they wanted a Federal subsidy. We were able to show them that what they really needed was sound research. We got them to start a project, and to jointly administer the project, to test the results, and to feed into the project samples of their manufactured objects. They are now going ahead full steam. They are patenting the results of the research and collecting royalties and plowing the royalties back into further research. This is a technique we use many times with the business community where the answer doesn't exist but the problem is broad enough and the industry is sufficiently significant to merit that type of attention.

The colonel, in speaking about the problems of dissemination of information, referred to our operation; and perhaps I ought to move on to that.

Back in 1945 the President signed an Executive order which created what is called the Publication Board. This Publication Board comprises six officers of cabinet rank. Their job basically, as defined in the order, is to implement a national policy, that the results of Federal research shall be made available to the business community when military security permits. Well, that is a very nice, broad policy, and the implementation naturally varies with the political climate and with the defense picture. Back in 1945 things looked very easy and all we had to do was to establish liaison arrangements with the armed forces, and immediately a flood of data came in. That, of course, has changed; and today we have to scrutinize very carefully the type of information we release and the degree of access of the "customer" to the technical data, as well as the over-all impact of a flood of government-sponsored technology even of an unclassified nature.

The way it works is rather boring, I suppose, unless you are directly interested in it. The various government agencies, including the military establishment, are under a directive to furnish us at least one copy of every declassified scientific report. There is a tremendous flood of this kind of data. We get about a thousand a month all unclassified. We review listings of several hundred more similar items to determine whether we would like to ask for any for review for declassification.

This great mass of material flows into a central point, where we have a reading panel. The reading panel's job is to analyze the report and determine whether it is of interest to the business community. If it is, we incorporate it in our operations. If it is not, we send it over to the Library of Congress, where it swells the collections. Actually everything ends up in the Library of Congress. We don't maintain any stocks of these reports at the Department, because the task of storage is too great.

Our next scrutiny is to determine whether the item is one which is of sufficiently popular appeal to merit duplication. If we estimate that it is, we will duplicate it and then in a sense advertise it to the scientific and industrial community.

This advertising of government reports takes a variety of media. We have a bibliography, which is a conventional bibliographical listing journal, broken up into the usual subject matter headings, with brief abstracts. We have a newsletter, which we send to all kinds of trade associations, technical societies, and scientific groups. In the newsletter we try to highlight significant acquisitions. We work very closely with the technical press, through press releases and through daily visits from their representatives in Washington. Also we maintain friendly relationships with all the small business associations

and trade associations. In other words, we use all the notification media, scientific societies, and all that type of thing--the NRC and so on. If we get a significant report, we may ask the NRC to review it in one of the scientific journals, which gives it a valuable prestige.

Now, as you may know, during the period after World War II we, jointly with the Army, ran the operation in Germany known as Field Information Agency, Technical. In that operation we acquired a great mass of data. We acquired original German factory information. We acquired samples of German equipment. We acquired survey reports written by our own people. We photographed and microfilmed many patent applications in the German patent office. We even brought back German scientists, as you know.

That type of operation left with us a large mass of unassimilated data; these data are just now beginning to be of interest again. Actually, we cut ourselves out of German operations about 1947. We thought that the industrial interest had been used up. But now we find that with critical shortages developing in this country and with the short supply picture, people are coming around and saying, "What did the Germans do in benzol? What did they do in chlorine? What did they do in critical materials?" So apparently we are going to have to dig out and reorganize a lot of these data and see that our present production picture takes advantage of some of the wartime economic necessities that the Germans were forced into.

We have also worked up a cooperative arrangement with the Atomic Energy Commission. As you know, the AEC has a terrific dissemination activity to universities and to contractors. The AEC has asked us to absorb for it the general demand for unclassified atomic data. As a result, the AEC prints over-runs of all its reports and furnishes them to us. It also prints a specific bibliography known as "Nuclear Science Abstracts." The AEC gives us stocks of that. We are its sales agent, you might say, for unclassified atomic data.

Of course, we must have very special arrangements on this type of information and particularly on foreign access. There are checks and counterchecks, I can assure you. It is not possible to advertise at large the kinds of scientific information you have and think that nobody but your friends are going to get it. But it isn't necessary to make it easy for the other fellow to get hold of it. So we do try to control the access. We also try to make sure that materials which have been unclassified are finally reviewed before they are made generally available.

I might mention that there are two basic techniques. With the Atomic Energy Commission, after the material is released to us, it is checked with the appropriate people here in Washington to make sure there is no objection to it going abroad. After that it is made freely available and then only to the United States public and to friendly countries.

With the military-sponsored data there is an office in the AG that has agreed to act as a sort of universal declassification office for the three branches, something that really has been badly needed. After information is acquired, selected, and organized, we go back to them and say, "We are about to release this. We want one final check." Colonel Clayton over there arranges that for us. He usually knocks out about one or two out of 500, which is quite a nominal percentage. It is a last safeguard before general release.

The kind of information that flows through and is of interest to the business economy is very diverse. Some of the things that would appear to be least interesting may be the most. I had an example last week of that. An industry man was over in the Navy Department. He had a development contract to produce some new electronic equipment and he was up against the resistor shortage. There is a terrific demand for resistors in industry and the capacity doesn't exist, hence he wanted to go into the resistor business. While he was sitting there talking to one of the officers in charge of the project, he found that the man had on his desk a report on a method of producing resistors which looked extremely valuable. In fact, our industry man thinks it is going to overcome the bottleneck in the industry.

So the officer said, "I would love to let you have this, but we can't. We don't have the authority. You don't have a contract yet." Since it was not a classified report, it seemed rather ridiculous to him. So he came over and jointly we negotiated the access to this material and this type of data. The title was a terribly dull one--something about the stability of resistors of peculiar characteristics--but the information was critical.

This report, according to the man, who is a retired Navy captain now in business, is literally a very significant advance. He just accidentally ran across it, and we just accidentally ran across it. Apparently our acquisition techniques were defective in that sense.

Another report that is coming across at the moment and is having a terrific impact in industry to my surprise is one called "The Handbook of Human Engineering." I don't know how many of you are acquainted with this, but in the physical sciences we have done a great deal of work in developing machines, making them more effective, improving their techniques, and making them do more and better things. Through the social sciences we are coming along pretty well on the idea of personnel selection, personnel training, and employee relations. Everything is beamed toward making the most efficient operators of the machines. But you get up to a place where you find that our human standard is near its apex, and so is the machine in terms of the engineering knowledge of today. So then you come to what is being called human engineering--the adaptation of the machine to fit the capabilities of the human.

That is a brand new area of engineering; and, not surprisingly, the Navy employees in their work with jet pilots found themselves right up against it. I suppose a jet pilot is as highly trained and competent and intelligent and well-coordinated an individual as you could find; but, nevertheless, in a jet plane, where he has to make of lot of complex decisions in a hurry, he makes mistakes. So the Navy Department contracted with the School of Experimental Psychology at Tufts and asked it to make an investigation of what it now calls human engineering.

Human engineering is all kinds of things. It is the recognition by a man that he is upside down, the feeling a man has when he is close to or far away from physical objects, the characteristics of individuals, and so on. Tufts has brought together what it calls a handbook of human engineering, which it plans to supplement from time to time.

This was done for the Navy, but we got hold of it and announced it to the technical press. Now fifty scientific journals have asked for review copies. So there are going to be 50 reviews in all strata of science and technology announcing this new area of research. It is important, because it is just as important for industry to design a machine in terms of the operator as it is for the military to design military equipment along the same line.

These, as I say, are highlights of several thousand types of reports and rough data that come through the operation. Some are ephemeral, some are really significant; but all of them are paid for by the taxpayer and when conditions of security don't overcome them, naturally he is entitled to know about them. Every gram of knowledge adds so much to a man who is working on the problem, and he contributes back. This "cross-fertilization" is one of the things that have made this country industrially great.

The Federal Government is spending on research something over a billion dollars a year, which is more than half of the national research effort, and the national research effort is higher than it has ever been before or that the world has ever seen. Accordingly you get some idea of the importance of the Federal contribution. As a matter of fact, many firms today won't initiate research without finding out what the Federal Government knows about it, what the Federal Government has done.

This points a finger to something that is really needed and doesn't exist, which is a central record of research in progress--a place where people properly qualified and cleared could go to find out what research is now going on, what the average of research is, in order that they won't embark on research of an unnecessarily duplicative nature. Duplicating research isn't necessarily bad;

but unplanned duplication is. With a method whereby they could find out who the people are to talk to, we could make sure that we take advantage of our scientific background and conserve facilities and manpower.

I was in Paris last year as an observer to the Organization of European Economic Cooperation meetings on cooperative research, and I ran up against this thing very decisively. The 15 Marshal Plan countries have banded together in what they call the Organization of European Economic Cooperation. Their objective is to exchange information between them, to do research cooperatively, and to do all kinds of technical things for their mutual benefit.

Basically, they are up against it. They don't have the amount of talent, they don't have the equipment, and they don't have the money to do research individually on big projects any more. Belgium and Holland should not individually do work on the Fischer-Tropsch process. It costs too much and the necessary equipment doesn't exist. So they, very intelligently, have gotten together on the idea of so-called cooperative research projects, in which one country is designated to do the work and all the other countries that have an interest contribute. They may contribute financially, they may contribute with manpower, or they may feed in their knowledge. There is a variety of techniques. Usually, they use a little of all of them. One of the things the Europeans insist on before they start a new project is a roster of known information giving the known level of research in all countries.

They are very eager to get the United States in as a full partner, for two reasons: One, they know we have plenty of money to put into this kind of thing; and, second, they know that the level of research here is high, and they don't want to start projects without feeding in our activities and our competence.

That general philosophy operates here at home just as well. As I said, industrial firms are quite reluctant to enter a new, vigorous field of research without some idea of what the Government has done. The writing up of final reports, as you know, lags a year or two behind the actual work. I have tried to get started a roster of research in progress, but I haven't had much luck. I get a lot of arguments why it shouldn't be done, but nobody really looks forward to see why it should be done.

The easy argument, of course, is, "A lot of this is classified and you couldn't have it anyhow." That is a very good point. But there is a terrific lot of work that the Bureau of Mines, the Department of Agriculture, the Bureau of Standards, and the military agencies are doing that is of industrial concern. If it were put together and given simple titles for identification, and reinforced by voluntary information furnished by universities and research institutes and industry, it would be a very valuable tool. It would save the economy a lot of money.

There have been stabs in this area. You may have seen the work on food and nutrition, a survey which we recently printed in cooperation with the National Research Council. That item contains over 3,000 research projects all over the country in the field of food and nutrition. It covers Heinz, Campbell, and Lipton as well as the Quartermaster Corps and the Department of Agriculture and the universities. That kind of tool is very valuable to the man who wants to do research in an efficient way. It also gets some business for people who are already in research; I mean, it indicates what they have done and what their special competence may be. This reference to a research-in-progress record is something that we genuinely need.

Another thing that we need is better mechanical means for the organization of research information. As Dr. Bush said several years ago, the flood of scientific data which are overwhelming us today may pose as great a problem as the atomic bomb. There is just too much information being poured out today for any competent agency to encompass it, and also for the established journals or the government publications to print it and put it in the hands of the researcher.

So we need badly, a machine--maybe it is a computer, maybe it is a memory device, maybe it is a photo cell adaptation--that we could put into and store current scientific information, where it could be coded conveniently, so that when a research problem arose, we could quickly bring to bear known related scientific data.

You may have read in the popular press about a machine that we built called the Bush selector. This machine is now on test down at the Department of Agriculture, where they are very good photographic facilities. Dr. Bush invented it back in about 1939. In essence its heart is a microfilm strip which is divided into two parts of information. It is a 35-millimeter film, and one-half of it is the technical information and the other half is the code. It passes by a photo cell sensing unit; and as it passes by at a high rate of speed, you intercept optically with a master code. When the code has the desired characteristics of the information you want to pick out, when you get absolute registry between the information on this reel and the master card which you have coded, the photo copying camera in the system photographs and picks off the selected information. That machine operates at the rate of 2,000 items a second and the camera is able to keep abreast of requirements. You can see that the machine makes some fairly decent searches in a hurry.

Actually the photo copying camera is a very interesting thing. We had to develop a camera which had a simple mechanism which would advance fast enough to pick up successive "hits." The Bureau of Standards people have developed one that looks as if it would make a good camera for the Air Force. It certainly has some very ingenious features. Now, that is only one step down the road. There is a need for better methods of organizing information and this is one modest contribution in that area.

To go back to this trip to Paris, I was over there with the OEEC. Among other things they said, "What do you people know in America about the organization of information?" I said, "Not a d----d thing. Not as much as you people do." Well, they couldn't believe that we hadn't some secrets over here. So they have organized a team of 21 European experts in documentation and technical information, who are coming over here on the Queen Elizabeth next month to make a visit around the country. I did my best to keep them from coming, frankly, because I thought it was a junket, and I still do; but they are insistent that we must have something over here because we are so mechanically ingenious and we write so many speculative stories.

It is an interesting thing. Over here, as soon as we are on the verge of something, as soon as we get a gleam in our eye, we put a story about it in the press. In Europe they don't announce anything until the thing is complete, ready to go, and is in production. Then they make a modest two-line announcement of it.

So, when they heard about this IBM computing machine, the Bush selector, and others that do all sorts of things, they thought, "My God, that stuff must be wonderful." We build up a sort of glamour which is going to be quite deflating to them when they get here and realize the state of organization of information in this country. I actually don't believe it is as good as it is in Holland and England, for example, where they are very competent, methodical, precise, and have these things well organized.

Because of the atmosphere of free exchange of information in this country, we are able to do things here, of course, that you can't do abroad. We have broken down between industries a lot of this secretiveness, a lot of this trade-secret problem. That is one reason, I think, we have been successful in government in procuring practical data to furnish to the small fellow; and, as I say, it is particularly because of the willingness of the larger unit to help the smaller out. When I say "the larger unit" I do not mean that you have a big fellow making shirts and a little fellow making shirts with the big fellow showing the little boy how to produce. Human nature doesn't work that way. You have to go one step back in the chain of production. If you can find a supplier of raw materials, he is quite interested in seeing that the little fellow who produces end items operates more efficiently. So when we go for technical aid to industry, we never go to somebody in the same competitive area. We go one step back, to the fellow who normally supplies the material that the little fellow uses, because he is always interested in expanding his market. If we have any secret in this acquisition of technical information, that is it.

Now, a distinct operation that we carry on is the National Inventors Council. Back about a year before Pearl Harbor a fellow named Lawrence Langner, who happens to be the producer of the

Theater Guild and who happens to be the leading member of a big international patent firm and who is in a lot of other activities, felt that the United States needed some link between civilian invention and military research. He agreed that the military people were very competent, but he thought there were some civilians who had ideas too. So he came to Washington and sold to the White House the concept of an eminent council of scientists and industrialists who would act in an advisory capacity to the armed services on invention as distinguished from research and who would act as a link between military inventive needs and the civilian community.

Well, Mr. Roosevelt liked the concept; he appointed Dr. Kettering, of General Motors, as chairman. On our initial staff we had Thomas Midgely, Orville Wright, and about a dozen additional experts. Through the years the membership has changed as some have died and others have come on. The present membership includes Admiral Luis de Florez, whom many of you know; Dr. Roger Adams, of Illinois; Dr. Oliver Buckley, president of Bell Laboratories; Homer Ewing, of DuPont; Fred Zeder, the vice-chairman of the board of Chrysler; and other men of that caliber. We have 17 such men in all.

They meet in Washington or out in an industrial area once every two months. We meet to discuss the problems with the military. We have regular liaison with Army, Navy, and Air Force. Our top liaison officers are General Putt, Admiral Solberg, and General Maris. The council works on problems of invention as distinguished from research, invention is the original seed idea as distinguished from the subsequent development. We also endeavor to feed out to competent people those problems of the military which are nonconfidential and on which civilian thinking can make a contribution.

We try in this operation to keep out of the public press. We are not interested in reading about ourselves in the "Readers Digest" or in "American Weekly" or any other publication, because that usually brings in a tremendous flood of half-baked ideas from people who don't have anything particularly to contribute.

Naturally there is a public service to be performed in this work. During World War II we did a lot of that sort of thing. We had correspondence with something like 300,000 amateur inventors. We had 13,000 personal interviews in Washington. Out of that volume of ideas and contacts there developed only three or four legal problems. Actually we don't have a single serious lawsuit despite this work load covering a 10-year effort. There are a couple of nuisance suits, which are being worked out.

We try as much as possible to work with a controlled audience, because we have found that the man who has helpful answers is a man who understands the problem. You don't take an electronic problem to a plumber, and you don't take a plumbing problem to an electronics expert. You go to a man with some related background. You give him

the military requirements and then you do begin to get some helpful ideas. We find that our best bet is working with competent groups.

For instance, on the Voice of America, they came to us and said, "We have this Soviet jamming problem. How can you help?" We remembered that up at MIT during World War II they had the Radar Countermeasures Group. The Radar Countermeasures Group was a bunch of young fellows who have stuck together in a sort of friendly society. We arranged for the chief engineer of the Voice of America to sit down with these men--about 60 in all. Now they have set up a group of panels working on ideas for the Voice of America, on methods of organizing their wave lengths, methods of spotting their transmitters, all types of techniques designed to pierce the Curtain.

Again we have gone to the American Psychological Association and said, "You know what makes people think. All right. What makes the Russians think? Give us some ideas that we can apply in the Voice of America program." We have gone to labor unions and said, "You have like bodies abroad. They think like you do. If you will sponsor some things of constructive character, it will help out." That is the type of effort we do in the Inventors Council. It is actually an "idea" council as much as inventions in the conventional sense.

During World War II we had an experimental fund for the development of inventions, which I ought to mention because it had an amusing reaction. This fund was a gambling fund. We were authorized, if the idea looked at all good or promising, in order to help the inventor, to spend some money on it in presenting it, to build a mock-up, maybe an experimental model, maybe only an elaborate physical presentation. So we would go to an inventor with a good idea and say, "We would like to help you spend some money with the idea of putting this idea across." Then he would go to his local bank and say, "I have a world-beating idea. It must be good or the Government wouldn't spend money on it." So we found that the fund helped present ideas often without actual expenditure.

Another activity that we carry on, which is related to what we normally do, is the program which we carry on under grant from the ECA. The ECA, as you know, has money for technical assistance, and we have been asked to do a lot of things for it. For example, we run a technical inquiry service for all the European countries--the type of thing I described.

The way is works is something like this: There are equivalents of our operation in each of the Marshall Plan countries. They receive from their industry technical problems. If they can handle them locally, or if they can handle them with their cooperating agencies in other countries, they are handled over there; otherwise they come to us, we compile the information and feed it back to the originating agency, with copies to all the rest. Thus you get a cross-fertilization of knowledge over there.

Another thing we do for them is a visual aids program. As you know, American industry relies a great deal on its apprentice training and its industrial improvement on film presentation. That sort of thing hasn't been comparably developed in Europe. So we have a program whereby we obtain films from the United States industry. We buy the films, then we screen them. For selected items we obtain the reproduction rights and copies of the master positives and the narration script and send them to Europe, where they are reproduced and shown in local languages in all the European countries.

We have extended that technique recently. When one of these European teams comes to this country, it is given a kit of related films. So, when they go back to Holland or England or wherever they go and when they lecture on what they have seen, they are able to show a film and say, "When I was in the United States that is what I saw." That technique is a relatively cheap, efficient way of extending our industrial technology to the Marshall Plan countries.

We do a lot of other spot technical services. I promised I would mention one of them. Recently we had a scientific adviser to Adenauer over here. He wanted to study industrial research in the United States to see if there was anything that the German Government could pattern its research after, because the German industrial institues and other industrial research activities have been disrupted, both accidentally and deliberately. So we sent him on a six-week tour of the United States, to visit every kind of research activitity we have, from big industrial laboratories to universities and the research institutes, to the consultant, to the private laboratory, and to the little type of operation. Right now he is preparing his final report, which I think will be of interest to some of you. I imagine that out of it will come a recommendation for a research institute in Germany patterned along the line of Battelle or Southwest or Armour--that type of activity--partially supported by the German Government and partially supported by German industry. We do a great deal of industrial research through such mechanisms and I believe the Germans could copy us profitably.

Another matter I ran into the other day incidentally is rather amusing. You probably have heard of Heisenberg, who ran the atomic research for the German Government. He turned up in Washington the other day wanting a lot of the marks allocated by ECA to the support of basic research in Germany under his sponsorship. Well, I have a strong personal opinion concerning this gentleman. Nobody in ECA had heard of him or his record. We were able to indicate to them that Dr. Heisenberg had a rather peculiar past and that basic research, while it was a desirable thing, might better be paid for by the German Government itself than by using ECA funds, which are of a short-term, applied nature. Heisenberg was a persuasive person, very glib, and he became very angry at this conclusion I am afraid; and I am very sorry.

Now, I think you probably have gotten the impression that we are involved in a lot of things that we don't know much about, which is quite true. We are in a lot of things--all facets of science and technology as they have an impact on industry.

This "Operation Paper Clip"--of course we work very closely in that. As you know, it is national policy to bring back German and Austrian scientists whom we don't want to get behind the Curtain. We work with the Joint Intelligence Objectives Agency. The JIOA is the implementing mechanism here. Of course, the experts can't all be employed by the military and many just don't want to be employed there. Maybe it is harsh to say this, but quite a few very able German scientists whom we don't want to see in the hands of the Russians don't wish to be employed in a military establishment, in a glorified prisoner of war status, such as they see some of their compatriots in. Pretsch is one of them. We want Dr. Pretsch. He is on the denial list. Pretsch is very interested in coming here to a private industry or university post, but he is not interested in coming here to work for the Air Force or under Air Force contract. So we are given the job of trying to get industry to hire these people.

As you can imagine we get into some very strange situations. I am working on one now--Dr. Kuhn. Dr. Kuhn is perhaps the world's greatest biochemist. He is located in Heidelberg. The military wants him here. So we induced the University of Pennsylvania to offer him a professorship. Then he said, "Well, that is not enough money." So the University of Pennsylvania induced one of the big chemical companies up there to give him a consultancy. That took care of the money. Then he came over here and he wanted to see what his housing was going to be like. The university found a lovely home. He has six children; they all have to come. He has a DP servant, and she has to come. And he has three junior chemists who work in a team with him; they have to come. That gives you an indication of the length to which the United States is going to pamper these individuals so that we can get them out of the hands of the Russians. The last I heard, the new immigration law blocked the whole thing. But we had it in the groove until that time and I suppose it will be worked out.

There is one last matter that I do want to touch on, because I think you should be interested in it--it is the North Atlantic Defense Pact. When I was on this rostrum last year I referred to it briefly and said that I saw coming up a very difficult problem, which is that if an American firm is expected to share its production secrets with a European firm in order that it can manufacture war equipment, there are going to be some long, complex, and delicate negotiations involved. Well, nobody apparently thought that was necessary. But all of a sudden, about two weeks ago the boys who are negotiating these agreements woke up to the fact, and the reason they woke up to the fact was that American firms were calmly saying "No."

The situation developed something like this: Let us say that it is decided that the French Army is to have rockets and that the rocket propellant is to be manufactured by a French firm. The French firm is agreeable, and they are given the formula. The French say, "Well, that is fine. We have a prototype, we have the formula. How do we make it in quantity? What are the safety measures? What are all the techniques?" You go back to the rocket section of Army Ordnance—its people say, "We don't know. It is industry that knows that kind of information." You now go to industrialists and they say, "Well why should we tell them? What is in it for us? Our production secrets are the only things that we have to keep us in business." So our people began to realize that there was a serious problem involved.

Representatives of the State Department, the ECA, and the Department of Defense came over to the Commerce Department and said, "Look, boys, you know these people in industry. Call a meeting." You know, it is very easy to call a meeting these days. You announce a meeting. Everybody comes because they are afraid something will happen that they won't hear about if they stay away.

So we had a meeting last week and 60 people showed up. We moved out of two offices into the third one to get space, and they were standing in the aisles. There was Standard Oil, Texas, DuPont, and Gulf—the competent companies were there; they were all interested in this program. The State Department people just laid it on the line. They said, "It is a part of our national policy that certain manufacturing capacity in Europe be diverted to war equipment. We realize that American industry has to share its production secrets. The only way that it can be done is if you fellows will come across. What do you need in the way of safeguards to participate?"

The whole tone of the meeting was full cooperation from industry—with some reluctance. The reluctances were very natural, and they can be summarized. "First," they said, "we want the normal procedure to be company-to-company negotiation. In other words, we don't want the Government to be making the contracts. We want to make the contracts. If the French firm wants our production knowledge, put him in touch with us. We realize that there may be difficulties in working out the details; and if time is involved, then it can be accelerated. The Government can move in to speed up the negotiation. But the normal thing should be company-to-company. Second, if we go into this kind of operation at the request of the United States Government, with its encouragement, and we suffer an unwarranted financial loss, we want idemnification." The boys thought that was reasonable. And then they said, "We are very wary of international deals because of the Antitrust Division of the Department of Justice. If we are going to get into this kind of negotiation, we want some sort of assurance that three years from now the Antitrust Division won't come around and say, "Look at this cartel that you have been embroiled in."

I think all three of those points are reasonable. I think something to reassure industry can and will have to be worked out, because we must have industry's cooperation if this phase of the program is going to work.

I could chatter on for another half hour, but we have run overtime now. I will now try to answer some questions.

QUESTION: Following my conference with you and after hearing your talk this morning it strikes me very forcibly that there are very many contacts that you must maintain with the armed forces and European industry, and that the number of people you have devoted to your task is insufficient. I would like to have your comment on it.

MR. GREEN: Naturally the normal answer of anybody who goes up against congressional budgets is that he hasn't enough people or money. But, actually, you may not know that last month Congress passed Public Law 776, designed and directed at the Secretary of Commerce, to strengthen this activity. We are going up to the Budget Bureau tomorrow, as a matter of fact, with a reasonable budget.

QUESTION: How would your organization fit in with the National Science Foundation if and when they may get to operating?

MR. GREEN: The basic intent of the National Science Foundation is to provide a continuing reservoir of pure scientists in this country. If you read the congressional hearings and the Steelman Report, the Bush Report, and all the rest, the realization there is that in the past the United States has always borrowed its pure research from Europe. We have a genius for taking a pure scientific discovery made somewhere else by an obscure scientist and harnessing all our industrial might to it and coming out with something productive. You can name almost anything—radar, penicillin—any field you want; and to date the pure discovery was made abroad.

Well, after World War II it isn't going to be that way any more. Surely, Europe is going to continue making its share of pure science activities. But we must in our own national long-term interest do some of this sort of thing ourselves. So the Science Foundation is going to be primarily concerned with scholarships and training, pure research operations all designed to build up a continuing supply of new facts.

The Department of Commerce is a little more earthy. We are interested in basic science, but more often in its applications. We are little later down the road. When the Science Foundation, if and when it gets going, develops a new fundamental fact, we will tell industry about it and point out its potentialities. I think we will dovetail very nicely.

QUESTION: I wonder whether we have gotten only one side of the picture of the German scientists who were brought over here. I remember that when "Paper Clip" was set up, there was a twofold or threefold motive. One was to keep them from going to Russia. Another was to get them over here into the military and then from the military into industry, where they would become American citizens and raise some more scientists for future generations. That is one thing I would like you to comment on.

The other thing is unrelated to that. The Inventors Council was a big help to the services, because it kept these thousands of inventors from coming to Washington to see the President. But of the thousands who presented ideas were any of them extremely valuable?

MR. GREEN: As to your first question, I don't think I can improve on the way you stated it. Certainly the operation "Paper Clip" was and is a threefold program--to strengthen our industrial science, to create a new corps of scientists, and to keep them out of the hands of the Russians. But I would say that today the accent is on the denial aspect.

We have arranged with ECA to use certain counterpart funds in Germany to keep these people employed, so that they won't gravitate to the Russians until we can pick them up. We have expanded the program to include Austria as well.

As to your second question, about the Inventors Council, there were about 1,000 inventions under test when World War II was over, and about 100 had been adopted. The most striking, I think, was the land-mine detector. There is a very amusing story involved in that.

Back in the early days a handsome, young bronzed guy walked through the door and said he was a professional treasure hunter, who down in the Florida Keys had run across an instrument which he had used to bring up brass cannon from old Spanish galleons at a 32-foot depth. It was a pair of balanced loops, and when metal came within their field, there was a displacement signal. It worked on nonferrous or ferrous metal and he thought that it might be used to locate submarines.

Well, we went into it a little bit, of course, and found out the theoretical limitations. But we said, "Have you ever thought of locating land mines with it?" He said, "I don't know what a land mine is." So we put him in touch with the engineers at Belvoir and they bought a half dozen of them through him. He was then acting as an agent for a small firm in Florida who manufactured loops. At the same time the Army Engineers had a research and development contract with one of the big laboratories to develop a suitable land-mine locator.

So the day came when they had the final tests, and the boys from the big laboratory came in and said, "Well we have done it. Here it is. It is just what you want." The engineers said, "Well, yes, thank you, but before we accept it, may we run a comparison with one we picked up ourselves." So they did, and this fellow's outperformed it. As a result they standardized on his and offered him a contract. He had a patent and a license per unit procured up to $50,000 was offered.

So he came around to see us. He said, "What about it?" I said, "Well, it sounds like a pretty fair deal to me." Fifty thousand dollars sounded like a lot of money. Nobody had any idea how many land mines we were going to be involved in at that time. This was back in the early days of World War II.

So all of a sudden the Germans began planting mines hither and yon, industrial capacity and output of detectors went up, and the first check this fellow got was for $50,000. It was his total return.

Well, that looked pretty good until the Internal Revenue came along and took $35,000 back for excess profits. He put the other into research and development and lost it. A few years later he came in again. He had been hunting rubber in the Amazon. He came through to say "Hello." I said, "Well, now, look. I think you got a pretty raw deal. It wasn't anybody's fault. Everybody thought they were signing a reasonable and fair contract, but it didn't work out that way. We are prepared to support you in legislation for relief." He said, "No. I made a deal with my government and I'll stand by it." That was the whole story so far as he was concerned, and I think the fellow was pretty decent.

QUESTION: I have another question about this National Inventors Council. I understood in studying the NACA that it had aeronautic patents; and that the Design Board, which was created in 1928, made a study of aeronautic patents and so forth and acted as such until this National Council was created, and that now it continues to operate but merely through representation on the Council.

MR. GREEN: That is right. And the head of NACA is a member of the Council.

QUESTION: You commented on the fact that there would be about a billion dollars put into research and development this year. I wish that you would break that down a little and give us the figures on industrial research and development and how much of these appropriated funds will find their way into other research.

MR. GREEN: It just can't be done. I hear the same question asked all the time. The last statement I saw on it was that the venture would run about two billion dollars, of which the Federal Government would get something over a billion dollars and that industry and universities combined would absorb the rest.

But there are no good figures. The last figures that you will find are in the Steelman Report of 1945. I think if you extrapolate them upward on a steady curve, you will probably do as well as anybody, and nobody will challenge you.

There is a need for such figures. The Budget Bureau should have them, but try to get them out of the Budget Bureau. I don't believe they know. It is one of the things that the Science Foundation might well do as a coordinating research activity. It might bring to light some of these areas of competitive research and perhaps exorbitant expenditures.

QUESTION: Assume a businessman of any sort wished to know how to build a better mousetrap. Is there any circumstance in which the Government would support or finance research to answer his question, or would you seek somebody else to sponsor it?

MR. GREEN: Certainly initially you would seek somebody else. But there was pending before the Congress, and still is pending, the so-called Small Business Act of 1950, which has five basic provisions, and one of those provisions is to provide venture capital for small business firms that wish to expand their output. Another is to perform research for small business where a broad base of industry will be beneficially affected.

I don't think the Government would ever do research of what you might call a product nature. In other words, your mousetrap concept would be straight commercial research beyond the legitimate scope of government. If such research is done, patents will result. The manufacturer will expect exclusive control of the patents, and he will get his return through that statutory monopoly.

There is an area of what I call background research which we have done, and perhaps will do again. I meant to mention it, but I talked too much about other things. During World War II we had the Office of Production Research and Development. That office did research where it would speed production. Maybe it was in finding out new facts about powder metallurgy. Maybe it was searches for substitute materials. Maybe it was an improved design of blast furnaces.

That activity was transferred to us. We liquidated its wartime operation and we carried on additional work on a peacetime basis. Right now the National Security Resources Board has asked us to make a survey of its reactivation in connection with the present emergency. We are right back again where we need substitutes. We need all kinds of production-increasing techniques. Perhaps this can be employed for national production.

But to answer your question a bit more specifically, I doubt whether the Government would or should ever use taxpayers' money to do research to help a single company. I doubt that it would or should ever get over into washing machines or that type of product improvement research. I certainly would feel it was a mistake.

QUESTION: One of the references on the Office of Technical Services states that your principal dissemination of information is concerned with declassified material, and implies that you are not involved in any dissemination of other types of material. I infer from your lecture that you are more generally interested in giving business every type of assistance. Would you clarify that?

MR. GREEN: Let us put it this way: This Publication Board, which was defined by the Presidential order, makes sure that unclassified material is made available to the business community. The order says that we have the right to review secret, confidential, and restricted matter and make recommendations to the military for declassification and subsequent dissemination. That is one phase of our operation, but we get into a lot of other things, under the general responsibilities to business of the Department of Commerce. The German scientist program is another operation, but it is a highly classified one.

I run a program of foreign patents, which I didn't mention. We take out patents abroad on selected inventions owned by the United States Government. When the United States Government does research and inventions result, the government agencies advise us and we patent them in other countries. Now, we run up against a very serious classification problem there, because certain foreign patent offices aren't safe deposit places for inventions. The British patent office is a safe depository.

QUESTION: In other words, you do not take any interest in disseminating any information on government research other than that which has been classified and you get it declassified? You don't try to gather other types and disseminate it?

MR. GREEN: I try hard to stay away from it. Very seriously, there is where you get in trouble.

QUESTION: In connection with this classification, I should think the Russians would keep a couple of research men busy over at the patent office all the time.

MR. GREEN: I was asked that question last year and I answered this way: The Patent Office reviews about 100,000 inventions a year. It has been variously estimated that 2 percent of them are commercially significant and that a fraction of 1 percent are truly significant inventions. Perhaps it is a good thing to let the Russians have every

patent that is granted and let them wade through that stuff and try to find out what is good and what isn't. It might divert them from other things. It is a problem but not so serious a problem as the newspapers would have you think.

QUESTION: Have you ever seen any evidence that they were doing that?

MR. GREEN: The Amtorg members did make bulk purchases in the Patent Office and in my office until they found out that we took their money and didn't send them anything. After a year of this they asked for their money back, and we were happy to return it. I had $15,000 of their money for a year, which I just ignored, and they just kept writing periodically for the information.

I don't think there is any question that espionage agents and foreign representatives do have mail drops and pick up isolated reports. But when you think in terms of 100,000 items in the Patent Office and the thousands and thousands of items of scientific research and technical data and all that sort of thing, it is a terrific job to analyze that stuff and find out what is truly important and what isn't.

I really wonder how good they are in analyzing our materials and finding out what is important. A patent is couched in very involved phraseology designed by the patent attorney to render it obscure to the public. I imagine it must be very confusing to a Russian.

QUESTION: I am interested in that question you raised about the manufacturers of hotel china. As I understood it, the complaint they had was that the plastics people were cutting in on their field and therefore they went to the Government and requested a subsidy. Was there any basis for that request?

MR. GREEN: I was something like this: The vitrified china industry is the hotel china, which is the rough china that you see in restaurants and that sort of thing. It is a "trade secret" industry. Often the producers are the offspring of fellows in Holland or England or Germany who came over here with closely hoarded trade secrets. They have been making their product the way their grandfathers made it.

Then the plastics industry began to move in. The glass industry, on the other hand, began to compete with surface decoration. Both of these were highly capitalized, rich industries. So representatives of this group—which, I think, consisted of 13 firms—came down to the Department of Commerce for a discussion and aid. They said, "Gentlemen, we are being forced out of business. Theoretically the Government believes in the preservation of small business. Theoretically the Government is prepared to help us. We are in a spot." The research program evolved from the general discussion.

We had 1.5 million dollars allocated at that time for research, so we said, "All right. This is what we will do. If you will block out a project and set up an advisory committee to run it, if you will put up part of the money, we will supplement your money. We will make it a cooperative operation. If you will then feed into that operation the test samples and try them back in your production lines and see what you have, we will have a true indication of industry value."

So that was done. The Battelle Memorial Institute took the work on and was very successful. They came up with new bonds and new glazes which made it a very superior product. Then we pulled out. We had initiated, we had stimulated, the research; our job was finished.

Then the manufacturers said, "O. K. Now we are so enthusiastic about research; we now know how to do it. We know the technique. We have found out that we can afford it collectively. Individually we couldn't. So we are going to carry it forward."

Later they came in and said, "Look. Some patents have come out of this and the Government has an interest although the patented invention actually resulted from work sponsored after your support terminated. What do you think we should do about them?" I said, "Well, I think you should collect royalties on your patents, but do us a favor and make them nonexclusive, reasonable royalties so that nobody will say that you are rigging the market or output, and take every cent that you get and plow it back into further research." They said, "We will be happy to do that. That makes sense to us." And that is the way they are doing.

That goes back to the question of the mousetrap question. Here was a broad basis of industry with a common problem, they were willing to do something about it themselves, but they lacked the stimulus and leadership. When those were provided, they were ready to carry forward on their own. That is the kind of work we would do again under the Small Business Act of 1950 if passed and implemented

QUESTION: I understand that your office is engaged in the flow of information from the government agencies, we will say, to industry, and the flow of information through ECA abroad. Is your office also engaged in the reverse flow; if so, is there any appreciable amount of it?

MR. GREEN: Yes. We are engaged in the reverse flow; but it is not so much as it should be. We are working constantly to strengthen it.

Now, when the Germans asked for 22 million dollars counterpart for applied research, which was granted--not the basic one, but the applied--we tried very definitely to make it a requirement that the

results of that research, which was indirectly paid for by the United States taxpayers, should be available over here. The ECA boys apparently couldn't see it. They said, "This would amount to interfering with the internal working of the German Government itself." Also the State Department is creating scientific attaches in the leading countries of the world and we are trying very hard to make sure that some of these people have heard of the words "applied science and technology." I mean, we are striving. Let us put it that way.

Actually the English are probably our best bet. The English are very applied science conscious as well as basic. They have a vigorous scientific mission here in Washington, and they realize that in their own intelligent interest it is wise to exchange information. We work very nicely with the British. We would like more access. It is an objective devoutly desired.

COMMANDER HARTMAN: John, this has been a most interesting and informative lecture and discussion. Thank you very much.

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