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Review Of The Operations Of
The Advisory Group On
Electron Devices Sponsored By
The Department Of Defense

B-169869

UNITED STATES
GENERAL ACCOUNTING OFFICE

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DEC. 9, 1974



UNITED STATES GENERAL ACCOUNTING OFFICE

WASHINGTON, D.C. 20548

PROCUREMENT AND SYSTEMS
ACQUISITION DIVISION

B-169869

The Honorable
| The Secretary of Defense

Dear Mr. Secretary:

The General Accounting Office has reviewed the operations
2 of the Advisory Group on Electron Devices (AGED) sponsored by
the Department of Defense (DOD). To a large extent, this was
a follow-on effort to a previous report dated June 2, 1969. p.659

The primary mission of AGED is to assist DOD by reviewing
research and development projects in the field of electron
devices and lasers proposed by the military departments, to
insure that the programs are economically sound, technically
feasible, and are not duplicative.

Our previous report showed that AGED was valuable in
determining the technical need and feasibility of research
and development projects. However, AGED was not able to
fully perform its mission because various military organiza-
tions did not provide it with all required information. We
recommended that you:

- Establish procedures to insure that DOD research and
development contract proposals are submitted to AGED
before the contract award.
- Require AGED to review proposed electron device
research and development projects to be performed by
the Army, Navy, and Air Force in their own facilities.
- Initiate discussions with appropriate civil agencies,
such as the National Aeronautics and Space Administra-
tion (NASA), for possibly expanding AGED's review
responsibilities.

In response to our previous report, the Office of the
Director of Defense Research and Engineering (ODDR&E) stated
that various actions had been taken to insure that military
agencies consult AGED before awarding electron device research

and development contracts. We initiated this review to evaluate the effectiveness of these actions. We found that many projects still are not coordinated or are coordinated after-the-fact and that participation by other Government agencies is limited. Details concerning our review follow.

BACKGROUND

AGED was established in 1961 by DOD Instruction 5129.39 to insure continuing review of military research and development programs on electron devices. Under the supervision, administration, and control of ODDR&E, AGED provides technical advice to assist ODDR&E and the military departments in planning and directing adequate, economical research and development programs on electron devices. During fiscal years 1972 and 1973, AGED reviewed research and development projects totaling approximately \$66 million.

In reviewing research and development projects, AGED uses not only specialists from the three military departments but also recognized experts from industry and universities who serve as DOD consultant members. These specialists and experts are assigned to working groups based on their particular area of expertise. There are four review groups:

Working Group A: Microwave devices, such as generators and amplifiers, detectors, and duplexing devices.

Working Group B: Low-power devices such as transistors, oscillators and amplifiers, memory devices, capacitors, and resistors.

Working Group C: Imaging and display devices, involving the technology used in detecting optical and infrared radiant energy.

Working Group D: Lasers and allied devices, such as solid-state, gas, detectors, semiconductor, and optical modulators.

When coordinating research and development projects, a working group tries to:

--Inform other Government agencies of proposed work.

--Avoid unwarranted duplication of effort.

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- Insure that a proposed work unit of one agency, whenever possible, is modified to include similar requirements of other agencies.
- Insure that the proposed work is considered in relation to work already underway so that the overall program in the particular field or subfield can be evaluated for soundness, balance, and adequacy.
- Determine the probable effect that facility and manpower requirements for the new work may have on existing projects.
- Provide a review of the soundness and feasibility of technical approaches and recommend more promising approaches.

Because of the scope and magnitude of AGED activities and because its members can devote only a small portion of their time, a full-time secretariat is provided under a contract with Palisades Institute for Research Services, Incorporated. The secretariat gives administrative support to the working panels; collects, analyzes, and disseminates information; and prepares reports. The contract is jointly supported by the military services and NASA at an annual cost of about \$400,000.

SCOPE OF REVIEW

We selected Working Group D, (Working Group on Lasers), for examination because of the importance of laser research and the interest in the management and supervision of this area expressed by the Congress. We met with representatives of AGED, ODDR&E, NASA, the military services, and the Defense Advanced Research Projects Agency (DARPA).

We also visited the Army's Combat Surveillance and Target Acquisition Laboratory, Fort Monmouth, New Jersey; the Naval Research Laboratory, Washington, D.C.; the Air Force's Cambridge Research Laboratory, Bedford, Massachusetts; and NASA's Langley Research Center, Hampton, Virginia. In addition, we contacted the Army Night Vision Laboratory, Fort Belvoir, Virginia; and the Naval Weapons Laboratory, Dahlgren, Virginia.

Statistics on the use of the Working Group were developed at the AGED office in New York City and in Washington, D.C.

EVENTS AFTER THE PRIOR REPORT

In response to our prior report, the Director of Defense Research and Engineering told us on August 19, 1969, that his office was taking steps to strengthen AGED. These were:

1. New implementing instructions issued by the Navy and Air Force calling for and defining the desired participation of all commands in the activities of AGED. Existing Army instructions were considered adequate.
2. A quarterly report of contracts which were either not coordinated or were coordinated after-the-fact and were to be provided to the Service Assistant Secretaries by the AGED secretariat. This was to permit continual policing of compliance with instructions.

In April 1970 the Director informed us that improved procedures had been implemented and he had established an internal group to review the functions of and need for AGED. This group later recommended that:

"The scope of AGED review should be expanded to include in-house work undertaken by the Services. There is some reluctance on the part of the Services to coordinate in-house work and there is an administrative problem in expanding the scope of AGED. A yearly * * * review could be handled by the present secretariat that could also serve as the [O] DDR&E pre-apportionment review. This would increase the effectiveness of the information exchange functions without administratively burdening the system.

"NASA should be invited to participate as a full member of AGED and submit their electronic device contracts for review by AGED. NASA is the major electronic device contracting agency and the government positions would be enhanced by the full participation of this agency."

The House Committee on Armed Services in its report dated June 19, 1972, on the authorization appropriations for fiscal year 1973, stated that it lacked confidence in the management and supervision of military research efforts. The Committee felt that the thousands of separate projects received little, if any, close scrutiny to determine if there were unnecessary overlap or duplication of effort. Using lasers as an example,

the report stated: "On the surface this appears to be an excessive number of individual laser studies or projects * * * (almost 1,100 individual on-going projects) * * * and undoubtedly include some unnecessary overlap and duplication."

On April 30, 1973, the Director of Defense Research and Engineering wrote the military services reminding them of our previous report. He stated, "the number of after-the-fact coordinations is increasing, and a number have been subsequently disapproved. This trend is of great concern * * * in view of recent Congressional charges that duplication exists in our R&D programs."

The Director identified the major problem as those organizations considering themselves exempt from the coordination requirement. The memorandum stated:

"The only work currently exempt from AGED review is the systems related high energy laser efforts coordinated by the tri-service / [D] ARPA Committee." [The Director asked the services] * * * "to take steps to eliminate after-the-fact coordinations * * * with AGED * * *."

New operating procedures for AGED and a new charter of the working groups were issued by ODDR&E on April 22, 1974. According to the new procedures:

"The Military Departments are expected to provide information for, and to participate in, reviews of all * * * [projects] * * * both in-house and external * * * of the Advisory Group prior to initiating, expanding, or extending any effort * * *."

The operating procedures included a provision exempting from the review process systems-related, high-energy laser projects. However, ODDR&E did not require mandatory compliance by either the services or the defense agencies.

RESULTS OF CURRENT REVIEW

Contracts awarded before coordinating with AGED

Our examination of the agenda and minutes of the Working Group meetings from July 1, 1972, through December 31, 1973, showed that the military services continued to award a large number of contracts without first coordinating with AGED.

We reviewed 141 contracts which the Working Group coordinated during the 18-month period and of which it approved 140. Approximately 44 percent of the approved projects were coordinated after the award of the contract, as shown in the following table.

Approved Projects Coordinated
by
Working Group on Lasers
July 1, 1972 to December 31, 1973

	<u>Number</u>	<u>Percent</u>	<u>Total amount</u>
Army:			
Before award	15	44.1	\$1,428,122
After award	<u>19</u>	<u>55.9</u>	<u>4,525,537</u>
	<u>34</u>	<u>100.0</u>	<u>\$5,953,659</u>
Air Force:			
Before award	43	66.2	\$5,251,800
After award	<u>22</u>	<u>33.8</u>	<u>2,620,594</u>
	<u>65</u>	<u>100.0</u>	<u>\$7,872,394</u>
Navy:			
Before award	20	48.8	\$2,277,106
After award	<u>21</u>	<u>51.2</u>	<u>2,712,665</u>
	<u>41</u>	<u>100.0</u>	<u>\$4,989,771</u>
Service totals			
Before award	78	55.7	\$ 8,957,028
After award	<u>62</u>	<u>44.3</u>	<u>9,858,796</u>
Grand total	<u>140</u>	<u>100.0</u>	<u>\$18,815,824</u>

The dollar value of the approved projects coordinated after the contract award amounted to over 50 percent of the total dollar amount of the 140 projects.

One project, amounting to \$163,000, was submitted after its contract award and was later disapproved by the Working Group. The project was allowed to continue until its scheduled termination, which occurred 6 months after the Working Group's disapproval.

In addition to the 141 contracts discussed above, 63 service contracts were accepted by the Working Group "for information." Projects accepted "for information" do not undergo the Working Group's coordination process but are referred to appropriate DOD agencies for their information. Those submitted for information included service high-energy laser projects.

In addition to the data developed from the Working Group's minutes, we also reviewed descriptive summaries of contracts on laser research projects obtained from the Defense Documentation Center. We chose 20 contract summaries awarded by a Naval research facility for discussion with representatives of ODDR&E and AGED to determine if they had been coordinated before award of the contracts.

These summaries were reviewed by AGED personnel who gave us the following information concerning action taken on the contracts.

	<u>Number of summaries</u>	<u>Percent</u>	<u>Contract amount</u>	<u>Percentage of total contract amount</u>
Coordinated before awards	5	25.0	\$ 229,734	15.2
Coordinated after awards	5	25.0	371,759	24.6
On present agenda	3	15.0	413,575	27.4
Not coordinated	4	20.0	175,887	11.7
Not in area of AGED's interest	<u>3</u>	<u>15.0</u>	<u>317,498</u>	<u>21.1</u>
Totals	<u>20</u>	<u>100.0</u>	<u>\$1,508,453</u>	<u>100.0</u>

An ODDR&E official also reviewed these summaries and generally agreed with AGED's determination.

Noncoordination of projects by DOD agencies

Our discussions with AGED and DOD officials showed that certain DOD agencies were not submitting their proposed projects to AGED for coordination. For example, we were informed by an AGED official that DARPA did not submit its projects for review. A DARPA official told us on May 8, 1974, that his agency had no written guidance on implementing the DOD

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Instruction and this may have caused misinterpretation of its policy for participating with AGED. On the same date, the DARPA Director of Materials Sciences prepared a memorandum for the record on his agency's policy for interaction with ODDR&E's AGED. The memorandum stated "* * * it is [D]ARPA policy that * * * [D]ARPA's agents in the Military Departments coordinate [D]ARPA programs with AGED and the rest of the services on a 'For Information Only' basis * * *."

Review of in-house projects

In-house projects have made up about 44 percent of the military services' research and exploratory development effort on lasers and related electron devices over the past 3 fiscal years. Contracted electron device research and development has decreased over the past 10 years, due partly to expansion of in-house efforts. We discussed with service officials the submission of in-house laser projects to the Working Group. Except for a short period immediately following our previous report, in-house projects have not been sent to the Working Group for review because there was no explicit ODDR&E requirement.

Other Government agencies' participation limited

Other Government agencies performing work in laser research and development include NASA, the Atomic Energy Commission, the National Science Foundation, and the National Bureau of Standards. According to AGED personnel, these agencies' participation with the Working Group on Lasers is, at most, limited. For example, NASA's participation with the Working Group is limited even though it is an associate member of AGED.

From July 1972 through December 1973, the Working Group reviewed only one NASA research project. About \$6 million was budgeted for NASA's laser research and development in fiscal year 1974. According to a NASA computer listing, work is in progress on 132 laser and laser-related research and development projects.

One reason for the limited participation suggested by a NASA official was that reviewing contract work without reviewing in-house work limits the effectiveness of the Working Group. Another reason was that no overall requirements and instructions were established by NASA headquarters. In August 1973 a NASA official wrote to ODDR&E stating:

"NASA is an associate member of AGED and its Working Groups for two purposes: (1) to keep us informed of the state of technology in a broader world than our own, and (2) to get well-informed and current advice as to how our proposed device-oriented programs fit into the overall picture of U.S. technology. The first of these we achieve by attending AGED meetings and circulating AGED documents. The second we can only achieve by receiving the considered opinions of AGED on NASA items which fit into the purview of AGED. It's here that I believe we can improve the process. I therefore propose that in the future NASA items which are supplied by our associate members or picked up from the Commerce Business Daily be given the same consideration as DOD items, including a recommendation for or against further activity. This is tantamount, in my opinion, to identical treatment of DOD and NASA items."

However, subsequent to this letter, neither ODDR&E nor NASA established procedures that would insure participation with AGED.

Representatives of the National Science Foundation and National Bureau of Standards told us the main reasons for their agencies' limited participation with the Working Group are:

- Lack of time and resources needed for effective participation.
- Differences in the agencies' respective missions, as compared with DOD.

We were told that the Atomic Energy Commission's laser research and development efforts are generally related to high-energy lasers and therefore do not fall under the purview of the Working Group. However, Atomic Energy Commission representatives occasionally meet with the Working Group to advise it of ongoing laser programs.

Observations of laboratory officials

A general observation made at the laboratories visited was that DOD's and NASA's guidance on specific laser research to be coordinated with the Working Group was too general and, therefore, open to various interpretations. Similarly, the

guidance and implementing orders established by the laboratories to insure participation were inadequate. It was suggested the following items be specifically included in revised guidance.

- The requirement for submission of in-house, as well as contract, projects and identification of their funding categories.
- Guidelines to differentiate between the type of research work to be submitted for information as opposed to coordination.
- A procedure to monitor and enforce compliance with the provisions of the new guidance.

It was also suggested that the standardized form used to inform the Working Group of contract efforts be a required part of the procurement package. This would insure that the Working Group was informed before the contract was awarded.

CONCLUSIONS

We believe AGED continues to be valuable in determining the technical need and feasibility of electron device and laser research and development projects. However, we feel that its effectiveness has been impaired by organizations not fully participating with it and by continuing exclusion of in-house research projects. If corrective action recommended in the previous GAO report had been implemented, we feel that better participation would have been achieved.

We recognize there will be organizations believing they do not require AGED review and a continuing effort will be needed to involve these organizations in the review process. However, we feel that all technology-base electron device and laser projects should be centrally reviewed for ODDR&E and other participating agencies.

RECOMMENDATIONS

To improve participation with AGED and its Working Groups we recommend that the Secretary of Defense:

1. Revise DOD Instruction 5129.39 to (a) specifically require such organizations as the Defense Advanced Research Projects Agency to fully participate in

AGED, and to (b) specifically identify in-house, as well as contract, work as falling under the purview of AGED.

2. Establish procedures to effectively monitor the participation of the services and other DOD agencies and periodically identify those not fully participating with AGED.
3. Initiate discussions with other Government agencies, such as the National Aeronautics and Space Administration, Atomic Energy Commission, National Bureau of Standards, and National Science Foundation, that may be undertaking or sponsoring electron device and laser research and development to encourage their participation in AGED.

We discussed our observations with officials of ODDR&E and considered their comments in preparing this report. We will be glad to also discuss our observations with you or your representatives. Please advise us of any actions you take regarding the matters in this report.

Copies of this report are being sent to the House and Senate Committees on Government Operations, Armed Services, and Appropriations; the Director, Office of Management and Budget; the Administrator, National Aeronautics and Space Administration; and other interested officials.

As you know, Section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions he has taken on our recommendations to the House and Senate Committees on Government Operations not later than 60 days after the date of the report and the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

Sincerely yours,



R. W. Gutmann
Director

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