

**A HISTORICAL SUMMARY OF THE
TECHNOLOGY REINVESTMENT
PROJECTS
TECHNOLOGY DEVELOPMENT
PROGRAMS**

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TECHNOLOGY DEVELOPMENT PROGRAMS**

**CONDUCTED BY THE RESEARCH TEAM
OF THE
DUAL-USE RESEARCH PROJECT**

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31 October 1996

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A HISTORICAL SUMMARY OF THE

TECHNOLOGY REINVESTMENT PROJECTS TECHNOLOGY DEVELOPMENT PROGRAMS

Introduction

Since its inception, The Technology Reinvestment Project (TRP) has, at different times, embraced projects in one or more of the following areas: Technology Development, Technology Deployment, and Manufacturing Education and Training (MET). The Military and Industry Panel of the Dual-Use Research Project focused on the Technology Development Projects in TRP. Thus, although general information about the overall TRP will be discussed in this report, the data presented here concentrates principally on Technology Development Projects. While the statistics presented in this report convey a sense of the magnitude of the TRP program, as far as the number of proposers and personnel involved, they do not support any real measures of success or failure.

TRP was in a state of change from its inception. Three competitions were held and each competition brought about new procedures and revised instructions to participants. Some of this was due to lessons learned by TRP in the early competitions and subsequent attempts to correct problems or to enhance the program. Other changes such as funding were the result of Congressional direction.

At the beginning of the Program there were eight statutory divisions of funding, four of

which funded Development projects. The Commercial-Military Integration Partnerships

statute required at least 50 percent non-DoD funding in the first year, 60 percent in the

second year, and 70 percent in the third and later years. The Regional Technology

Alliances Assistance statute required at least 50 percent non-DoD funding per year. The

Defense Dual-Use Critical Technology Partnerships and Defense Advanced

Manufacturing Technology Partnerships each required at least 50 percent non-Federal

funding per year. By the third competition, statutory funding was available only under

the Defense Dual-Use Critical Technology Partnerships. Table 1 shows the distribution

of winning projects between the Development statutes by competition.

TABLE 1. STATUTORY REQUIREMENTS

DISTRIBUTION OF PROJECTS BY STATUTORY REQUIREMENTS Program Element 0603570e FY 1993 FY
1995 TOTALS Defense Dual-Use Critical Technology Partnerships 341482 Commercial-Military Integration
Partnerships 1511026 Regional Technology Alliances Assistance Program 150015 5 5 010 TOTALS 6930133

Background and Purpose

The Defense Conversion, Reinvestment, and Transition Assistance Act of 1992 led to the establishment of TRP by the Defense Advanced Research Projects Agency (DARPA). DARPA was chosen for its extensive experience in developing high risk technologies of relevance to the military in cooperation with industry. DARPA was responsible for the TRP budget and was required by Congress to work in concert with other Government Agencies on this program. With DARPA in the lead, a multi-agency council, the Defense Technology Conversion Council (DTCC), was created to advise, coordinate, and execute competitions. DTCC participants included high ranking officials of the Departments of Energy (DOE), Transportation (DOT), and Commerce's National Institute of Standards and Technology (DOC/NIST), the National Science Foundation (NSF), and the National Aeronautics and Space Administration (NASA). In addition, a DTCC Working Group,

also led by DARPA, was formed with representatives from the Federal partners and the Army, Navy, and Air Force. The military members helped ensure that TRP focused on military problems and benefits. The Working Group contributed both technical and managerial expertise and was co-located in the TRP office suite.

TRP was the largest dual-use technology development effort ever attempted by the DoD. TRP held three solicitations and selected 133 Technology Development consortia. Continued management of most of these programs will be required for about two more years. The documents and files maintained by the TRP Working Group contained historical data on every facet of TRP. Among the records of interest are solicitation announcements, outreach literature and briefings, proposal counts, evaluation criteria and results, program agreements, and remarks and trip reports by program managers and Working Group staff members. Data extracted from these records were used principally to compile statistics on the TRP process.

The TRP Way of Doing Business

While most of the data in this report focuses solely on the Technology Development area there are some data which precluded the ability to distinguish one focus area from another. Information contained in the Innovative Organizational Features, Outreach, and Announcements sections of this report reflect data gathered and pertaining to all three TRP technical areas, Technology Development, Technology Deployment, and Manufacturing Education and Training unless otherwise noted.

Innovative Organizational Features.

TRP, managed by only five full-time DARPA staff and a Director (who was also Director of DARPA's Defense Sciences Office), was a lean organization not burdened by a large permanent bureaucracy. However, at the height of TRP activity (1993-1995) more than 400 people served in various support capacities. The immediate support staff consisted of the Working Group and a Government contractor who provided administrative support by manning the 1-800-DUAL-USE lines, mailing brochures, providing database support, typing letters, and receiving, logging, and filing the proposals.

Although office space was provided on-site for the Working Group members, they were present on a part-time basis. Most of the Working Group members maintained their regular full-time positions and considered TRP work as a temporary additional duty. They helped select the technical focus topics, write the Proposal Information Packages (PIP), publicize the competitions by traveling the road shows, and answer correspondence and phone calls, etc.

The third competition stressed more military involvement in the process and featured a more direct military relevancy. By Congressional direction, the topic areas were selected by the Military Departments to represent their most compelling needs or interests. As mandated, the Military Departments were also heavily involved in the proposal selection process. The military made up at least 51 percent of each selection panel. In addition by executing Technology Development projects through the Military Departments, TRP built

a cadre of Department people who understand how to leverage commercial R&D for military benefit.

There were several hundred technical and contracting support personnel from DARPA and participating Agencies who served as proposal evaluators, contracting officers, and program managers for the three TRP technical areas. Also available to TRP were the part-time services of four legal staff personnel.

Outreach.

With much help from their support contingent, TRP was able to reach outside the traditional Defense research community and communicate with many organizations and individuals through a wide variety of mechanisms. To promote and explain TRP concepts, Road shows preceded each competition. The presentations at these road shows were aimed at providing sufficient information for an understanding of the process behind TRP and the process required for proposal submission. Copies of the Program Information Package (PIP), a comprehensive brochure detailing all facets of the TRP program that included requirements for submission of proposals and outlined evaluation criteria, were distributed to attendees. Following the formal presentations, informal sessions were offered where the Working Group members would meet with individuals to answer any remaining questions specific to their situation.

Additional outreach activities included the 1-800-DUAL-USE telephone line and TRP World Wide Web site (<http://www.trp.darpa.mil>). The 1-800 telephone line was manned 12 hours a day by trained operators. There were 35,827 calls logged during 1993 and in 1994 there were 33,736 calls. Calendar year 1995 had 5,290 calls, a significant drop. However, this could be attributed partially to the fact that the Web site had an average of 16,000 hits per month during that same period. Even though the delivery method had changed, it was clear that an outreach information service was still being utilized by the public. The Web is still in existence today and remains comprehensive. It contains all presentation and solicitation documentation, a schedule of events, and an up-to-date list of points of contact as well as supporting documentation such as Congressional language that affects the program.

Prior to the first competition, over 4,600 individuals attended presentations during April 1993 in New York, Detroit, Orlando, Dallas, and Los Angeles. The second competition outreach meetings were handled a little differently. Seven meetings, designed to focus on the seven selected topic areas, were held during May 1994. Instead of the TRP Working Group going around the country, the general public was invited to attend meetings held in Northern Virginia. One was also held in Denver, Colorado. In addition to CBD (Commerce Business Daily) and Web Page announcements, invitations were mailed to organizations or individuals who attended the first Road shows, submitted a proposal to the first competition, or requested information through the 1-800 phone line. More than 3,000 individuals attended the presentations for the second competition.

In November 1994, to kick off the third competition, the TRP Working Group traveled to

Boston, Denver, Seattle, Oakland, Philadelphia, Chicago, Austin, and Atlanta. A much smaller crowd of 1,800 attended these “road shows.” Reduced attendance may have resulted from: (1) many interested proposers had already attended previous road shows and were familiar with the TRP process, (2) the topic areas were more focused, (3) the Deployment and MET technical areas had been phased out, and (4) the future funding of TRP was questionable (Congress had begun to push for a different kind of dual-use program and companies were unsure of funding).

In addition to outreach activities aimed at the public, seminars were held for Government personnel. The Government meetings were held in July and August 1994. Program managers and contracting officers from the first competition and the second competition were invited. Lessons learned were related by many attendees and a number of interface problems and issues were discussed. Relationships and roles of DARPA, TRP, Agencies, and the partnerships themselves were discussed. A major acknowledgment was the compelling need for more and better communication among all members throughout the entire process, from selection of topic areas through negotiations of the agreements. As a direct result of these seminars early kick-off meetings for each selected project were scheduled allowing a better working relationship between the Government and other partners.

Announcements.

Even though TRP was conducted outside the Federal Acquisition Regulations (FAR), by law every TRP project had to be selected solely on its merits through a fair and open competition. TRP adhered to this requirement rigorously and believed it crucial to the quality and credibility of the program. Every TRP project was selected without regard to geographic location or any factor other than the published criteria.

There were three solicitations/competitions with subsequent announcements of winners. Due to Congressional language which initially called for specific set asides, the first competition actually had four separate announcement dates — the first being October 22, 1993. This announcement was made by President Clinton and Vice President Gore at the White House. Successive announcements for this initial competition were on November 24, 1993, December 12, 1993, and February 23, 1994.

Table 2. TIME TABLE OF SIGNIFICANT COMPETITION EVENTS

Competition Program	
Begins PIP	
Published	
Outreach Concept	
Papers Due Solicitation	
Published Proposals	
Due Evaluations	
Completed	
Announcements	First Dec 16, 1992 Mar 10, 1993 Apr 1993 N/A May 14, 1993 July 23, 1993 Sep 28, 1993 Oct 22, 1993* Second Dec 14, 1993 Apr 1994 May 1994 N/A May 20, 1994 June 30, 1994 Sep 20, 1994 Oct 21, 1994 Third Jan 4, 1994 Nov 7, 1994 Nov 1994 Dec 21, 1994 May 12, 1995 June 29, 1995 Nov 18, 1994 Dec 21, 1995* See Preceding Paragraph

As Table 2 indicates, although TRP employed unique and innovative efforts and concepts,

its solicitation process was ultimately no faster than the traditional competitive solicitation and perhaps in some areas, even slower. Based on published dates, it is clear that the first and second competitions had similar timelines. The third competition, however, was a little slower in implementation. Though an extra event, the Concept Paper process was introduced in the third competition, it did not cause undue delays. Most delays were the result of outside forces and were not within the control of TRP. Many decisions were held pending the uncertain outcome of future funding. Once the Defense Appropriations Bill was passed and a line item identified for TRP, the program could continue with the competition as had been planned. However, by this time, the original schedule was three to four months behind.

Responses.

TRP always made a concerted effort to increase the number of militarily relevant proposals it received. After the first competition, it was evident that much of the proposal community did not understand the relationship between TRP's means (commercial viability) and its ends (affordable advanced military technology). Many of the proposers incorrectly perceived TRP as a "defense conversion" program designed solely to help people affected by Defense downsizing. As a result, TRP received many inappropriate proposals. This problem may have stemmed from a number of factors including the broad array of TRP's activities, the expectations and rhetoric generated in a time of some economic distress, and TRP's difficulty in clearly communicating its Defense orientation and objectives. TRP attempted to solve this problem by sharpening its overall message to the proposal community, emphasizing that its aim was military—not economic benefits. As a result, the second competition had a greater proportion of militarily beneficial technologies proposed. It was also about this time that Military Categories were introduced.

With Congress's interest in projecting the Defense relevance of TRP, it was determined that the selected Technology Development efforts should be categorized by military needs. Seven categories emerged. Table 3 identifies the categories and the number of projects funded in each category. The distribution between competitions was driven by the topic areas that were advertised in the request for proposals. Although only three of the categories were represented in all three competitions, all of the military categories had significant representation which is indicative of TRP's ability to reach many areas of military need.

Table 3. Defense Relevant Military Categories

Military Categories	1st Competition 1993	2nd Competition 1994	3rd Competition 1995	Total
Battlefield Sensors	68	51	9	128
Causality Treatment	11	14	23	48
Electronics Design/Manufacturing	91	18	8	117
Mechanical Systems/Materials	70	61	3	134
Military Mobility & Deployment	20	22	2	44
Weapons, Survivability & Other	50	9	14	73
Total	693	304	133	1130

The volume of proposals generated under the first competition nearly overwhelmed the TRP staff and was very costly both in dollar value and time involved for the proposers and for the TRP staff. Because of Government dollar limitations, the ratio of proposed-to-selected programs was very low and thus frustrating to the proposers. As shown in Table 4, the win rate for the Technology Development area rose significantly with each succeeding competition.

Table 4 also depicts the number of proposals received and selected during each of the three competitions by topic area. The third competition had the additional "concept papers" process that is described at the end of Section E.

Table 4. NUMBER OF PROPOSALS RECEIVED/SELECTED BY TOPIC AREA

**“Gov’t Amt” in the table is the amount of funding TRP had available prior to each competition. The final negotiated amount varied slightly.

Third Competition-1995 Concept Paper Data
Concept Papers Received
Proposals Received
Topic Area

Selected \$M Gov’t Amt** Concept Papers
Received Areas Eliminated
Prior to Request for Proposals

13428	Biological Sensors and Multiorgan Diagnostic Screening	5\$15.0	31	Ceramic Material Applications: High Performance Ceramics	211	Affordable Polymer Matrix Composites for Airframe Structures	00	23	Cryogenic Coolers for Electronic System Applications	6822	Affordable Advanced Controls Technology	642.5	63	Electric and Hybrid Tactical and Commercial Vehicles	7720	Digital Wireless Communications and Networking Systems	623.4	65	Low Cost Specialty Metals Processing	17533	Operations Other Than War/Law Enforcement (OOTW/LE)	621.0	33	Millimeter Wave Products for Military and Civilian Applications	467	Small Precision Optics Manufacturing Technology	412.8	215	Total Number received under eliminated Topic Areas	358	Microelectromechanical Systems (MEMS) Applications	27.8	70	Number received but not reviewed (MET or Deployment)	17824	Other	516.8	422	Total Number received for non-funded or not reviewed Topic Areas	734143	Totals	34\$139.3	734	Total number received for funded Topic Areas	Selection Rate = 23.8%	1156	Total Concept Papers Received for
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Third Competition Selection Rate = 23.8%
Second Competition-1994 Proposals Received

Topic Area
Selected \$M Gov’t Amt** 13 High Density Data Storage Systems 2\$16.0 10 Object Technology for Rapid Software Development and Delivery 319.5 38 Interoperability Testbeds for the National Information Infrastructure (NII) 523.2 24 High Definition Systems Manufacturing 348.3 40 Low Cost Electronic Packaging 938.3 8 Uncooled Infrared Sensors 321.6 32 Environmental Sensors 59.5 3 Other 00 **168 Totals*30\$176.4** Selection Rate = 17.8% *Dollar value shown reflects amount that was set aside to fund the 30 selected proposals; however, only 28 reached agreement. \$10M from High Density Data Storage Systems and \$4.5 M from Interoperability Testbeds for NII was redirected to the next competition. **First**

Competition-1993 Proposals Received
Topic Area

\$M Gov’t Amt** 272 Information Infrastructure 11\$87.6 171 Electronics Design and Manufacturing 943.6 124 Mechanical Design and Manufacturing 321.6 2143 Health Care Technology 9 Training/Instruction Technology 13.0 204 Environment Technology 7.1 112 Aeronautical Technologies 735.2 261 Vehicle Technology 525.5 76516.7 26 Advanced Battery Technology 38.3 93 Other 719.1 **1827 Totals 69\$327.6** Selection Rate = 3.8%

Source Selection Process.

All winning projects were selected using a rigorous, multi-tiered Source Selection Process. This process was designed to prevent outside influence and ensure that the best proposals prevailed.

Several evaluation requirements were mandated by Congress. These included partnerships, private sector cost sharing, technical excellence, and Defense relevance. Congress also required that several groups should be beneficiaries of the program: small and Defense-dependent businesses, historically black colleges and universities, minority institutions, and state and local organizations that were assisting in defense conversion efforts.

The second competition selection process is used as the example of how all the competitions were run (with only minor changes in each). Evaluation teams were comprised of technology experts from the Department of Defense and the other five Federal Agencies participating in TRP [Commerce (NIST), Energy, Transportation, NASA and NSF]. Every evaluator signed a Conflict of Interest Statement and an Unauthorized Disclosure of Information Agreement. Evaluators were prohibited from discussing proposals or their status outside the selection process.

TRP solicited proposals in specific technology focus areas. For each area, DARPA established a Focus Area Evaluation Committee, composed of a DARPA Chair and technical experts from DoD and the other Agencies. TRP assigned each proposal to the appropriate Focus Area Evaluation Committee.

Proposals were rated by individual evaluators in the appropriate Evaluation Committee. Evaluators used only the criteria published in the TRP solicitation. After the individual ratings, members of each Evaluation Committee met to discuss the proposals and each proposal was given a consensus score and rank. Individual evaluators were permitted to submit a minority report if they disagreed with the consensus of the Committee. As an additional step, the Committee was allowed to seek clarifications to proposals. No changes to a proposal were allowed as part of any clarification. Based on all of this information, proposals were assigned a final ranking by the Focus Area Evaluation Committee; the highest ranked proposals were then forwarded to the Technology Development Panel.

The Technology Development Panel was chaired by DARPA and was composed of representatives from DoD and each of the other five participating Agencies. There was no overlap between members of the Technology Development Panel and the Focus Area Evaluation Committees. The Focus Area Evaluation Committees presented their highest ranked proposals to the Technology Development Panel and panel members ranked proposals across all focus areas. The Technology Development Panel then forwarded its recommendations, consistent with program budget limits, to the Defense Technology Conversion Council (DTCC) Working Group.

The DTCC Working Group, chaired by DoD with representation from the participating Agencies, reviewed the recommendations of the Technology Development Panel to ensure quality and consistency. Finally, the recommendations of the Working Group were presented to the DTCC, which was chaired by the Director of DARPA. Because TRP funding was appropriated to DARPA, that Agency retained the final Source Selection Authority.

The source selection process remained fairly constant throughout the three competitions. However, for the third competition, Congress mandated that the Military Representatives make up the majority of members (>50 percent) on the Source Selection Evaluation Board (SSEB), previously the Focus Area Selection Committee. TRP went to great lengths to ensure that this mandate was carried out. The SSEBs recommendations were forwarded to the Technology Evaluation Panel, previously the DTCC Working Group, with final review and approval by the Source Selection Authority.

Prior to the third competition, TRP adopted the concept paper process as an additional way of providing guidance and direction for the proposers. It was designed to give feedback on ideas before a full proposal was written, partly to alert people that their proposals might have inadequate Defense benefits. Interested teams were strongly encouraged to submit a five page concept paper before investing time and effort in the development of a full proposal. Feedback from this process could be used to help make the decision on whether to prepare a full proposal. It was TRP's goal in using concept papers to discourage full proposals where there was a low probability of being funded by TRP and to provide constructive feedback to those whose ideas had a better likelihood of success. The concept paper evaluation team had many of the same members who evaluated the final proposals. The same confidentiality rules applied for evaluation of the concept papers as for final proposals. TRP feedback included a qualitative rating of the concept paper for each criteria, the number of concept papers submitted in that particular focus area, and guidance to assist proposers in the decision about whether to submit a full proposal.

For the third competition, Congress had directed that the Army, Navy, and Air Force each provide at least two topic areas of special interest. A number of Topic Areas were eliminated between the concept paper evaluation process and the actual solicitation because of funding constraints. Those areas eliminated were determined by the Military Departments to be their lowest priority. Congress did not appropriate funds in the Regional Technology Alliance Assistance statute and that area was also eliminated. Partnerships.

Congress mandated that every TRP project be lead by a consortia. Proposals submitted under the Technology Development area were required to be submitted by a consortium, comprised of two or more eligible firms and/or a non-profit research corporation. An eligible firm as defined by legislation was a company or other business entity that conducted a significant level of its research, development, engineering, and

manufacturing activities in the United States. A firm not meeting this test may have been an eligible firm if its majority ownership or control was by U.S. citizens. In addition, a foreign-owned firm may have been eligible if its parent company was incorporated in a country whose government encourages the participation of U.S.-owned firms in research and development consortia where that government provides funding. But, that government must also afford adequate and effective protection for the intellectual property rights, as determined by the Secretary of Commerce, of companies incorporated in the U.S.

TRP Consortia regularly combined complementary talents from the defense and commercial sectors, academia, and nonprofit organizations. For example, roughly 75 percent of the Development projects selected in the first competition included both a commercial firm and a defense firm. With the right combination, teams can often address a broader set of problems than an organization working alone.

Table 5 represents a breakout of the types of organizations that formed TRP Consortia while Table 6 provides a demographic look at the Consortia.

Table 5. TYPES OF COMPANIES AS PARTICIPANTS

Table 6. NUMBER OF PARTNERS IN CONSORTIA

The majority of the consortia (54%) were composed of 2 to 4 members. Another 27% had 5 to 7 members. Forty of the top 100 Defense firms were represented on a consortia (many belonging to more than one consortia). Winning consortia were demographically distributed with organizations in 42 states and 4 foreign countries (Ireland, Canada, Japan, and the Netherlands) receiving funding. California, Massachusetts, and New York, in that order, lead the states as far as number of proposals submitted and number of proposals selected. Not surprisingly 51% of the lead companies were from these three states.

Consortia Data

#of Members in Consortia	Winning Consortia Per Competition	Total Winning Consortia	Winning Consortia
Percentage	First	Second	Third
21%	11%	14%	16%
12%	31%	55%	82%
21%	41%	57%	82%
53%	13%	75%	65%
18%	14%	7%	7%
22%	11%	8%	4%
84%	12%	75%	91%
122%	10%	22%	15%
111%	22%	12%	11%
121%	122%	131%	122%
161%	11%	171%	11%
111%	21%	124%	11%

Small businesses proved to be an excellent source of emerging technology and entrepreneurial energy and participated quite heavily throughout TRP. For all three competitions, an average of 58 percent of TRP’s Technology Development consortia had a small business on the team (see Table 7). For the second and third competitions, TRP implemented Congressional mandated changes in its cost-sharing rules to allow Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) funds to count as non-Federal dollars, making small businesses more attractive team members for TRP Development projects. Very few consortia took advantage of this cost sharing mechanism. In the second competition only four winning proposals used SBIR cost share, and in the third competition there were seven embedded SBIR participants in six projects.

Congress continued to seek increased participation for small business. Starting with the third competition and the passage of the FY 1995 Defense Authorization Act, Congress allowed small businesses, if selected, 120 days to provide acceptable documentation of available and quality cost sharing. This basically meant that after winning an award, they could obtain a loan (based on the assured Government award) for their share of the funding. But, as shown in Table 7, there appears to have been no direct effect by this action. In fact, the percent of selected projects with at least one small business decreased from the second competition. There was no data collected by the TRP office to substantiate if any of the small business participants actually took advantage of the 120 day period.

Table 7. SMALL BUSINESS PARTICIPATION

Competition	Development	Projects Only	First	Second	Third	Average	Percent of selected projects with at least one small business
49%	70%	56%	58%	Percent of proposed projects with at least one small business	55%	73%	70%
66%	Percent of selected participants that are small business	14%	24%	24%	21%	Percent of proposed participants that were small business	21%
29%	35%	28%	Innovative Agreements.				

TRP was conducted outside the Federal Acquisition Regulations (FAR). TRP projects were investment partnerships in the interest of all the parties; they were not procurements. A TRP relationship required more flexibility than a typical Federal contract, which assumes a buyer-seller relationship. FAR procedures would have been

both inappropriate and too rigid for TRP. An "Other Transaction" allowed for a more commercial-like device. Although most of the non-DoD Agencies and the DoD Military Departments had authority to use this type of negotiating document, before TRP only DARPA aggressively pursued this innovative vehicle. The other Agencies and DoD Military Departments primarily relied on the Cooperative Agreement as specified in the FAR.

At the end of the second competition there were 97 signed agreements in place. Of those, 57 percent had been negotiated under a Cooperative Agreement and 38 percent under the innovative "Other Transaction" authority. The other five percent consisted of grants, NASA's Space Agreements, and other similar contracting vehicles. As of mid-August 1996, there were still five unsigned partnership agreements from the third competition. The mix of document type, however, had now changed. The Military Departments had taken over as the negotiation lead on all but one of the 34 selected proposals. But unlike the previous competitions, they began to make use of their authority in the "Other Transaction" area changing the percentages of Cooperative Agreement (now 48 percent) and Other Transaction (now 43 percent).

In order to provide a distinction between the two major types of contracting vehicles used to negotiate TRP partnership agreements, the definitions were included in a TRP Program Information Pamphlet (PIP).

Cooperative Agreements are used when the purpose of an agreement is to transfer something of value to the recipient to support and stimulate R&D for some public purpose. Government funding is more in the nature of an investment in such situations than a purchase. Procurement contract regulations generally do not apply, so there is flexibility about such things as intellectual property rights.

Other Transactions are just that - any form of transaction that is not a grant, contract, or cooperative agreement. These may include (but are not limited to) loan agreements, coordinated research, consortia, joint funding arrangements, and reimbursable arrangements. Such agreements can be structured with great flexibility to meet the needs of the participants and the Government in each particular situation.

TRP worked to create an environment that encouraged people to learn new methods. In this way, TRP became a catalyst for fundamental changes in the R&D methods used by all DoD Military Departments and other Federal Agencies. Two advantages in using the other transactions are:

Property Rights - "In case of agreements that are not contracts, grants, or cooperative agreements ('other transactions') disposition of rights in inventions shall be structured through negotiations so as to best serve national security objectives of Section 2501, Title 10, United States Code."

(2) Intellectual Property Rights - Treatment of intellectual property issues shall be extremely flexible, with due consideration given to the underlying purposes of the programs, particularly, the national security objectives under Section 2501, Title 10, United States Code.

Cost Sharing.

Cost sharing is one way to ensure that the team is committed to the project and believes that the technology is commercially viable. It also encourages efficient and diligent project management. TRP paid no more than half the cost of any project. In fact, over 60 of the winning consortia contributed more than 50 percent even though not mandated to do so. Sharing the cost made each project a risk-sharing investment of interest to all the parties, not a sale to the Government.

Partner cash contributions took a number of forms. Considered acceptable were: (1) contributions from project participants and third parties, including states, counties, cities, companies, or other sources; (2) revenues from license fees and royalties; and (3) fees for services performed.

In addition, in-kind contributions were acceptable in some cases. They included (1) compensated services of full-time and part-time personnel; (2) in-kind value of equipment (including software) necessary and reasonable for proper and efficient accomplishment of project objectives; and (3) in-kind value of land, buildings, or space necessary and reasonable for proper and efficient accomplishment of proper objectives. The PIP described in detail how a proposer could apply and use his cash and in-kind contributions. From the first two competitions, approximately 22 funding agreements included in-kind contributions. The exact number is difficult to identify due to the various methods that the individual contracting officers used to present this information. Dollar value for the combined contributions is also very difficult to identify. There was no set algorithm. Each company brought its own unique contribution to the partnership and the value equation depended on a lot of variables. This information is incomplete for the third competition.

The majority (64 percent) of the partnerships were for a 24 month base period of performance, the shortest period being 12 months and the longest 36 months. Several agreements did identify optional work. All options had the same cost sharing requirements as the base efforts and had to compete for available dollars. The TRP Working Group selected options primarily on the merit of the base program, but also kept in mind the constraints of available funding. To date, 28 projects have received optional funding.

For a general ideal of the dollar size of the negotiated agreement, proposals are grouped by total amount of base agreements. There were 47 projects under \$4 million; 45 projects between \$4 million and \$10 million; and 41 projects fell into the category over \$10 million. These levels have been based on the TRP share times two (assumes at least 50 percent cost share).

Summary of Major Milestones

October 1992	Defense Conversion, Reinvestment, and Transition Act of 1992 becomes law
Winter 1992/93	Basic TRP strategy and Federal team formed
March 1993	Fiscal Year (FY) 1993 competition announced
February 1994	Final selections from FY 1993 competition announced
April 1994	FY 1994 competition announced
October 1994	Selections from FY 1994 competition announced and FY 1995 competition announced
December 1995	Selections from FY 1995 competition announced
February 1996	Joint Dual-use Projects Office is formed

Analysis/Conclusions

TRP made significant progress in establishing a new way of doing business. Because of the innovative, free thinking people who were associated with this program, TRP was able to implement many concepts not previously used. The concept paper process, the "other transactions" negotiation tool, the lean but quality management with a strong support structure, and the outreach activities are some of the areas in which TRP excelled.

TRP was a training ground for the Military Departments in how to utilize "other transaction" authority. Although the Military and other Agencies had the authority to use these innovative techniques for consortia agreements, they were reluctant to proceed prior to TRP. It required a culture change for the numerous contracting officers and lawyers, both on the Government side and in industry, to accept the use of "other transactions." By the third competition, the Military Departments had begun using these "other transactions" and gaining confidence in them. TRP built a cadre of Department people who understand how to leverage commercial R&D for military benefit. Without TRP in the forefront pushing, this concept would not have succeeded.

The outreach activities were extensive and successful, contacting thousands of companies and individuals who probably would not have otherwise known about the program. Other programs should consider using some or all of the methods applied. There were drawbacks however. These outreach activities required a lot of time, energy, manpower, planning, and dollars. Most new programs may not have the support that was available to TRP. By being a combined effort with other Government Agencies, DARPA/TRP was able to take advantage of the talent from those Agencies.

Cost sharing requirements did not appear to be a serious impediment to potential proposers—as noted by the number of proposals received in all three competitions. All companies supported their share of the investment and in some cases provided more than the required 50 percent. This supports the fact that industry is interested in doing business with the Government and is prepared to carry their share of the investment if there is a return in it for them.

TRP was never a static program. TRP management initiated several changes and

Congress mandated some. Table 8 on the next page provides a list of the changes.

Overall, the data in this report cannot prove or disprove the technical merit or success of the TRP program. A follow-on report should be considered in the next 24 to 36 months when the majority of TRP projects will have concluded. At that point in time, conclusions may be drawn on the technical aspects based on the analysis of the final technical reports. The study should include measures of success in both the achieved and potential benefits to the military in their utilization of the products born from this program. It should also include the achieved and projected commercial outcome of the program. Only this type of data will provide the final chapter for TRP as to the impact of TRP on dual-use.

Table 8. CHANGES AMONG COMPETITIONS

First Competition **Second Competition** **Third Competition** **8 Funding Statutes**

3 Activity Areas

Technology Development
 Technology Deployment
 Mfg. Educ. & Tng 4 Funding Statutes

2 Activity Areas

Technology Development
 Technology Deployment 1 Funding Statute

1 Activity Area

Technology Development Topic Areas
 11 general/broad topic area
 plus "Other" category Topic Areas
 7 tightly defined focused topic
 areas - no "Other" category Topic Areas
 7 definitized topic areas
 plus "Other" category Structure of DTCC
 Composed of DOE, DOC, NASA,

Structure of DTCC

Composed of DOE, DOC, DOT,
 NASA, NSF and led by DARPA Structure of DTCC
 Congressional change that mandated
 Army, Navy, Air Force membership
 (Military now played a more
 significant role) Selection of Solicitation Topic Areas

TRP Working Group with help of
 DARPA Program Managers Selection of Solicitation Topic Areas
 DARPA Program Mangers provided
 topic areas for consideration

Selection of Solicitation Topic Areas

Congressional change that mandated
 Army, Navy, Air Force contribute 2
 areas of greatest interest to their
 Department (DARPA provided 1) Small Businesses

Addressed only as a separate set-
 aside (separate solicitation was
 held); not identified as participating
 TRP proposers within the larger

Small Businesses

Congressional change mandated
 that SBIR and STTR funding could
 be used for cost sharing by small

Small Businesses

selected small businesses had 120
 days to secure and provide
 acceptable documentation of
 available and quality cost share Selection Criteria

Tech Approach & Mgmt Plan
 Pervasive Impact on Nat'l Security
 Commitment to Productization Selection Criteria
 Information Package (PIP) did
 following each criteria Selection Criteria

No change but Program Information
 Package (PIP) included
 best to worst Types of Cost Share

Cash, including IR&D, state or local
 government funding, revenues from
 any non-Federal source

Types of Cost Share

Cash
 In-Kind
 SBIR and STTR Funding Cash
 In-Kind
 SBIR and STTR Funding Solicited Full Proposals

(No Concept Papers)(No Concept Papers)Solicited Concept Papers
Prior to Full ProposalsExecution of Agreements

DoD 32
Army 5 (5)
Navy 4 (3)
Air Force 13 (7)

Non-DoD 37
DOE 11
DOT 9
NSF 3_ Execution of Agreements

DoD 16
DARPA 6
Army 3 (2)
Air Force 5 (1)

Non-DoD 14
DOE 7
NASA 2 (1)
DOT 3 (1)

Execution of Agreements

DoD 34
DARPA 1
Army 11 (1)
Navy 12
Air Force 10

Non-DoD 0

Numbers in parenthesis signify those agreements executed by that Agency but signed by DARPA. This was usually done for expediency and/or use of "other transactions" authority. Acronyms:

- DTTC - Defense Technology Conversion Council
- SBIR - Small Business Innovative Research Program
- STTR - Small Business Technology Transfer Program
- IR&D - Government Independent Research & Development Funds

VI. TRP - The Next Generation