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Program Information Package for Defense Technology Conversion, Reinvestment, and Transition Assistance

March 10, 1993

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1. INTRODUCTION

It is the mission of the Technology Reinvestment Project (TRP) to stimulate the transition to a growing, integrated, national industrial capability which provides the most advanced, affordable, military systems and the most competitive commercial products. TRP programs are structured to expand high quality employment opportunities in commercial and dual-use United States industries and demonstrably enhance U.S. competitiveness. This will be accomplished through the application of defense and commercial resources to develop dual-use technologies, manufacturing and technology assistance to small firms, and education and training programs that enhance U.S. manufacturing skills and target displaced defense industry workers.

This Program Information Package addresses defense industry and technology base activities under eight separate statutory programs and sets forth planned selection criteria by which proposals received under a future solicitation will be evaluated. The Advanced Research Projects Agency (ARPA) of the Department of Defense, the Department of Energy/Defense Programs (DOE/DP), the Department of Commerce's National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the National Aeronautics and Space Administration (NASA), are collaborating in the Technology Reinvestment Project to execute the programs authorized under the Defense Conversion, Reinvestment, and Transition Assistance Act of Fiscal Year 1993, and other legislation. The TRP is administered by the Defense Technology Conversion Council (DTCC), chaired by ARPA and will conduct a future solicitation of proposals within the guidelines of this Program Information Package. Funding for TRP activities will be cost shared with non-Federal Government entities.

Here, and in the document in general, the term *program* is used to refer to one of eight statutory divisions of funding within Title IV of the Fiscal Year 1993 Defense Appropriations Act. Descriptions of each program can be found in Section 2.2.1 and specific requirements for cost sharing and participation are found in Appendix B. The term *activity* refers to specific proposed efforts and tasks that respond to a formal solicitation. Activities of interest are described in considerable detail in Section 2.1.1, 2.1.2, and 2.1.3, and in Appendix A. Activities are naturally grouped into *activity areas*: Technology Development, Technology Deployment, and Manufacturing Education and Training. Criteria for selection for each activity area are shown in Appendix A and apply to all proposed activities in that area.

This Program Information Package provides information on TRP programs useful for formulating and structuring proposal teams, developing ideas and concepts, selecting activities, identifying funding sources, determining matching funds requirements, and conforming with statutory requirements. It also contains policies that regulate various aspects of the program. In general, proposers should first match a proposal idea with an activity area (Technology Development, Technology Deployment, or Manufacturing Education and Training). Then the proposer should review Appendix A and select an activity. A review of Figure 4 will then identify potential funding sources (statutory programs). Finally, a review of Appendix B will focus the proposer on a specific TRP program. This document will assist you in the following ways:

- Section 2, "Technology Reinvestment Activities," describes the TRP mission, strategy, distributed execution model, eligibility, and statutory programs.
- Section 3, "Planning for Submission of Proposals," provides information about the proposal structure planned for the forthcoming solicitation.
- Appendix A, "Proposal Activity Area, Planned Selection Criteria and Examples," explains in detail the activities of interest, and includes numerous examples.

- Appendix B, "Statutory Program Requirements," describes each statutory program and its specific requirements and provides information needed to verify the eligibility of proposers and participants.

1.1 JOINT AGENCY COMPETITION

A single competition is planned for the selection of proposals for Technology Development, Technology Deployment, Manufacturing Education and Training, and Small Business Innovative Research (SBIR). The process is expected to include:

(a) joint agency issuance of a formal solicitation of proposals;

(b) joint agency evaluation, ranking and selection of proposals;

(c) distributed execution through a variety of funding vehicles, including grants, cooperative agreements and "other transactions," through the member agencies of the DTCC.

1.2. SCHEDULE

The following schedule is planned and **is subject to change**.

- March 12, 1993 — Program announcement published in Commerce Business Daily and Federal Register. Request mailing of a single copy of the Program Information Package by:
  - calling 1-800-DUALUSE (1-800-382-5873) Monday through Friday from 8:00 AM to 7:00 PM, Eastern Standard Time
  - faxing (703) 471-2372 addressed to Technology Reinvestment Project, PA#93-21
  - electronic mailing: Internet Address pa93-21@darpa.mil
- April 12 to 16, 1993 — Information conferences (locations and schedules will be published separately in the Commerce Business Daily and Federal Register)
- May 14, 1993 — TRP solicitation published in Commerce Business Daily and Federal Register. Request mailing of a single copy of the solicitation by:
  - calling 1-800-DUALUSE (1-800-382-5873) Monday through Friday from 8:00 AM to 7:00 PM, Eastern Daylight Savings Time
  - faxing (703) 471-2372 addressed to Technology Reinvestment Project, PA#93-21
  - electronic mailing: Internet Address pa93-21@darpa.mil
- July 23, 1993 — **Planned date** for submission of proposals, 4:00 PM Eastern Daylight Savings Time
- Announcement of initial awards is expected in the last quarter of Fiscal Year 1993.

2. TECHNOLOGY REINVESTMENT ACTIVITIES

In a fully collaborative, government-wide effort called the Technology Reinvestment Project, ARPA, NIST, DOE/DP, NSF and NASA will seek to harness the best talents available to focus on technology innovation, extension, infrastructure, and education and training for product and process technologies of critical importance to both national security and the national economy. To administer the TRP, the agencies involved have formed the Defense Technology Conversion Council (DTCC) via a Memorandum of Understanding of all the participating agencies. The DTCC is chaired by ARPA and is responsible for coordinating and integrating Federal Executive Branch activities for technology reinvestment. The TRP mission and strategy, as defined by the DTCC, are shown in Figure 1.

DEFENSE TECHNOLOGY CONVERSION COUNCIL (DTCC)

TECHNOLOGY REINVESTMENT PROJECT MISSION

To stimulate the transition to a growing, integrated, national industrial capability which provides the most advanced, affordable, military systems and the most competitive commercial products.

TECHNOLOGY REINVESTMENT PROJECT STRATEGY

Invest Title IV[1] funds in activities which:

1) Develop technologies which enable new products and processes.
2) Deploy existing technology into commercial and military products and processes.
3) Stimulate the integration of military and commercial research and production activities.

Figure 1: TRP Mission and Strategy

The TRP will accomplish its mission through cooperative, inter-agency efforts that address the technology development, deployment, and education and training needs within both the commercial and defense communities. Concerted efforts will be made to bolster the economic competitiveness of defense-dependent enterprises and increase the availability of dual-use technologies for national security purposes. Solicitation, evaluation and selection of proposals will be accomplished jointly involving all of the collaborating agencies. Execution of TRP programs will be done on a distributed basis, with oversight by ARPA, and with execution by the Military Departments and DoD Agencies, NIST, DOE, NSF and NASA.

2.1. ACTIVITY EMPHASIS

Activities fall naturally into three broad areas. They are: Technology Development, Technology Deployment, and Manufacturing Education and Training. Each of these areas relates directly to the TRP mission and strategy by stimulating the integration of the military and commercial industrial bases. Technology Development activities create new technologies or apply existing technologies to demonstrate viability of new products and processes. Technology Deployment activities disseminate existing technology

[1] Title IV of the 1993 Defense Appropriations Act provides funding for the programs described in this Program Information Package. Three programs under Title IV will be executed by separate mechanisms: Agile Manufacturing and Enterprise Integration; and Advanced Materials Synthesis and Processing; and, U.S.-Japan Management Training.

for near-term commercial and defense products and processes. Manufacturing Education and Training activities strengthen work force capabilities necessary to maintain and improve a competitive industrial base in the far term.

Figure 2 illustrates the stages of technology transitioning and the relative positions of Technology Development and Technology Deployment activity areas. The first stage, technology creation, is most often the successful result of research in either the public or private sector. The second stage, technology extraction, is the transitioning of a result away from the initial point of creation in a direction towards some general application. This is often accomplished by performing a product feasibility demonstration or an early prototype, and, as a consequence, this stage is still very much "technology push." At the third stage, technology distribution, the technology is identified with a particular product or application and its development can be focused with precision. This stage is the beginning of "user pull." Finally, with technology consumption/productization, the technology is fully incorporated into a product or a process that is sold.

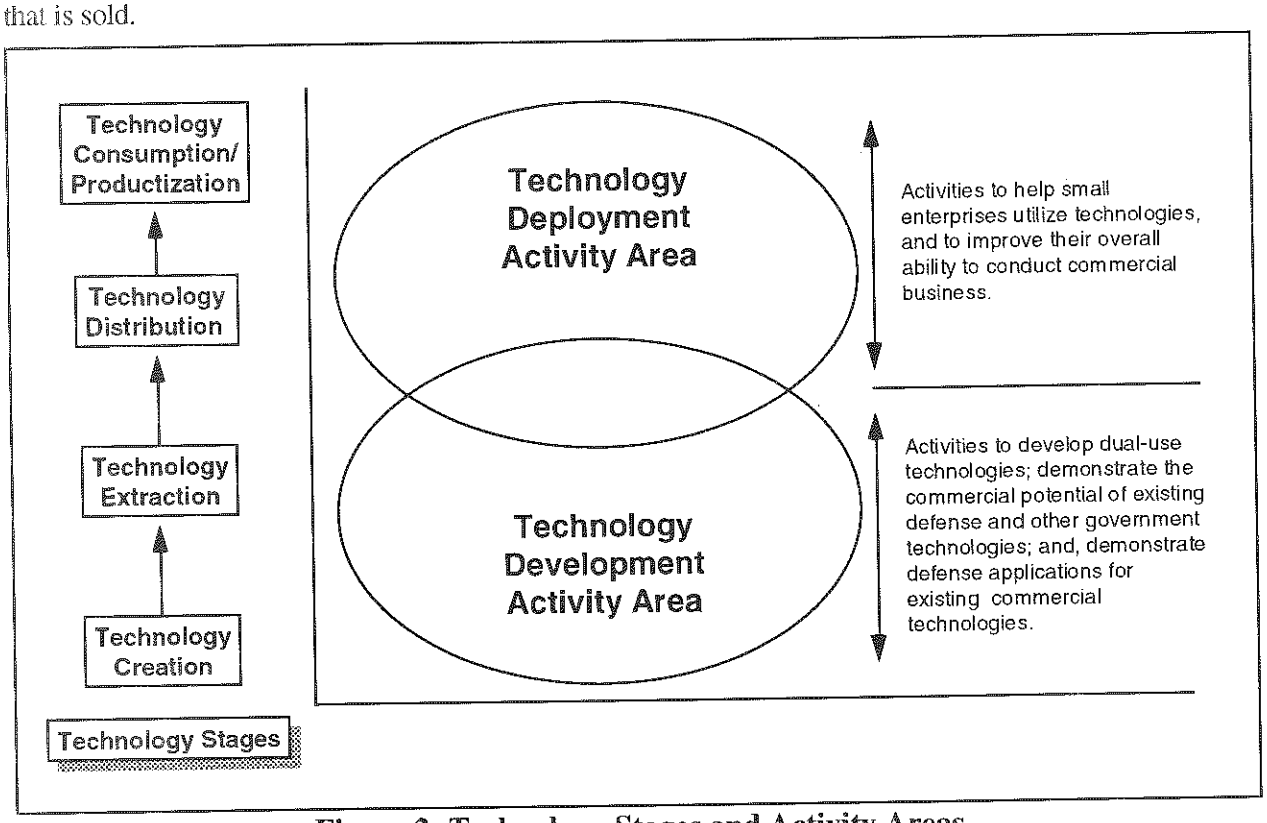

Figure 2: Technology Stages and Activity Areas

2.1.1. Technology Development

Technology Development activities deal with the creation of new product and process technologies and exploration of their potential for commercial and/or defense applications. It is intended that these activities will result in applied technology development at the pre-competitive level. *Proposals that involve either basic research or final product development beyond the stage of product prototype/feasibility demonstration will be regarded as out of scope.*

Selection of Technology Development proposals is expected to favor activities in the first and second stages (technology creation and technology extraction), but where there is clear commitment by the proposer to productize. Proposals will fall into one of three activities:

(1) Spin-off Transitioning activities are those that demonstrate non-defense, commercial viability of technologies already developed for defense purposes. The primary purpose of spin-off activities will be to make use of existing government owned or developed defense dual-use technologies to improve U.S. competitiveness across a broad spectrum of industrial sectors and enterprises.

(2) Dual-use Development activities are those that develop commercially viable technologies that have both defense and non-defense uses. Preference will be shown to activities that enhance national security, result in more affordable defense systems, and offer commercially viable products or processes.

(3) Spin-on Promotion activities are those that demonstrate the defense utility of existing non-defense, commercially-viable technologies. Preference will be shown to activities that increase the affordability of existing and planned defense systems, by improving design, engineering, development, production, logistics support, life-cycle support, training, adoption of commercial standards, and cost reduction from economies of scale in production.

The following Technology Development focus areas will be emphasized:

- Information Infrastructure
- Electronics Design and Manufacturing
- Mechanical Design and Manufacturing
- Materials/Structures Manufacturing
- Health Care Technology
- Training/Instruction Technology
- Environment Technology
- Aeronautical Technologies
- Vehicle Technology
- Shipbuilding Industrial Infrastructure
- Advanced Battery Technology

A more complete description of each technology focus area is given in Appendix A.1.

2.1.2 Technology Deployment

Selection of Technology Deployment proposals will favor activities in the third and fourth technology stages shown in Figure 2. Proposals will fall into one of four activities:

(1) Manufacturing Extension Services are activities which target small businesses (fewer than 500 employees) with an emphasis on assisting enterprises dependent upon defense. The goals are to increase competitiveness through technical and management advancement, redirection or restructuring of business practices, assistance with accessing training and consulting services, and assistance with the transitioning of technologies from research to commercially viable products and processes. Extension services will also seek to stimulate the introduction and use of advanced technologies to improve both products and manufacturing processes, including activity-based accounting, concurrent engineering, and new management problem solving techniques. Examples of existing extension service providers are NIST's Manufacturing Technology Centers, Manufacturing Outreach Centers, and the State Technology Extension Program. Other forms or types of extension services will be considered based upon their relevance to the specific needs of small manufacturers.

(2) Extension Enabling Services are activities that link together providers of extension services with each other as well as with the developers of technology. This activity will explore a variety of possible approaches to development of the institutions, processes and services needed to link

together and strengthen the capabilities of extension service providers. Possible activities include information systems for locating technology sources to solve manufacturers' problems, training for extension field agents, benchmarking, and evaluation services. Preferred activities are pilot projects with detailed documentation, evaluation, and analysis of outcomes which show the ultimate success of the approach.

(3) Alternative Deployment Pilot Projects are innovative modes of technology deployment that are alternatives to Manufacturing Extension Services. The aims of such activities will include understanding and improving the interactions between prime contractors or original equipment manufacturers and their supplier chains, rationalization of quality and other requirements placed on suppliers by several prime contractors within an industrial sector, and adoption of world-class best manufacturing practices throughout the prime contractor-supplier structure. An important component of this activity will be thorough documentation of the pilot project, analysis of the results, and publication of a detailed case study to enable comparative assessments of competing approaches.

(4) Technology Access Services are activities to assist the private sector with acquiring existing and emerging dual-use and commercial technologies from defense and other government sources. A particular focus is to develop means for making technology available to extension service providers and small manufacturers. National laboratories, Department of Defense laboratories, NASA Regional Technology Transfer Centers, NIST laboratories, university centers, Centers of Excellence, and other public entities involved in such pursuits may form the nucleus for such activities. Private services, including nonprofit and corporate laboratories, will be considered.

2.1.3. Manufacturing Education and Training

In addition to Technology Development and Technology Deployment, proposals will be solicited in the activities area termed "Manufacturing Education and Training." Selections will favor those proposals that improve the general state of U.S. competitiveness and productivity and provide a high quality work force for the 21st century. Activities should provide new manufacturing engineering education and training opportunities, including fellowships to reorient and equip defense and commercial technical professionals for the design and manufacturing base of the future. Emphasis will be on dual-use engineering skills and the improvement of technical capabilities at the university, college, and vocational levels. The use of experienced manufacturing experts and engineers in classroom settings, including the structuring of alternative curricula, will be encouraged.

Proposals will be solicited for the following Manufacturing Education and Training activities which are explained in detail in Appendix A:

(1) Engineering Education in Manufacturing Across the Curriculum
(2) Practice-Oriented Master's Degree Programs
(3) Retraining the Manufacturing Work-force
(4) Educational Traineeships for Defense Industry Engineers
(5) Manufacturing Engineering Education Coalition
(6) Supplementary Education Awards to Ongoing Centers and Coalitions Devoted to Manufacturing
(7) Individual/Group Innovations in Engineering Education in Manufacturing.

2.2 Eligibility and Statutory Programs

Funding for the Technology Reinvestment Project is provided by the Fiscal Year 1993 Defense Appropriations Act as listed in Table 1. Eight programs are specified in the law; the funding for each program has been adjusted for various legislated reductions and a 1.5% SBIR set-aside. Each has a unique

focus; however, three statutory requirements are common to all: (1) all programs require competitive awards, (2) all contain certain participation and organizational requirements, and (3) all require cost sharing of at least fifty percent (50%).

Table 1
Fiscal Year 1993 Title IV Appropriations
for TRP Programs ($ millions)

Defense Dual Use Critical Technology Partnerships	$81.9
Commercial-Military Integration Partnerships	42.1
Regional Technology Alliances Assistance Program	90.5
Defense Advanced Manufacturing Technology Partnerships	23.5
Manufacturing Extension Programs	87.4
Defense Dual Use Assistance Extension Program	90.8
Manufacturing Engineering Education: Grant Program[2]	43.6
Manufacturing Experts in the Classroom	4.6
Small Business Innovative Research Program[3]	7.2
Total	**$471.6**

Figure 3 arranges the TRP programs according to the technology stages in Figure 2. While individual programs address only select portions of the technology "spectrum," together the full range is covered—from technology creation through to its consumption and commercialization. Appendix B is a plain language summary of the statutory requirements of each program and should be studied closely.

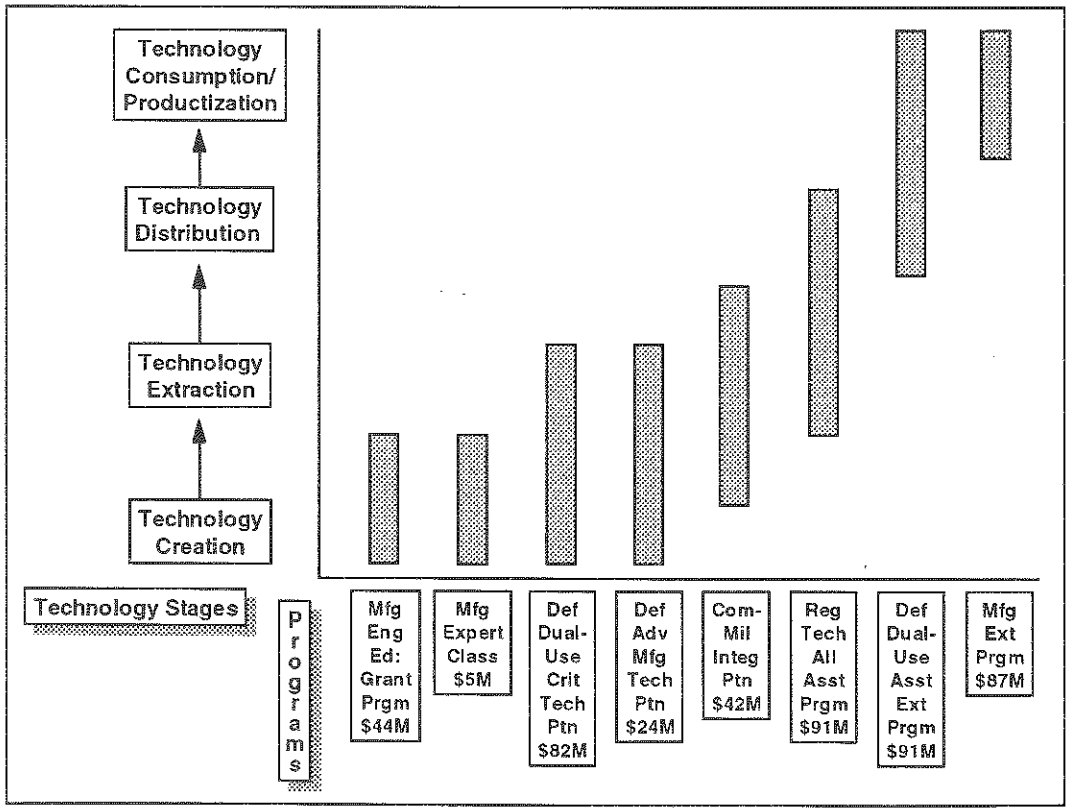

Figure 3: Technology Reinvestment Program Emphases

[2] Includes $20.1 million of FY 1992 funds for Manufacturing Engineering Education: Grant Program.

[3] See Appendix C for details on the SBIR provisions of this Program Information Package.

2.2.1. TRP Statutory Programs

The following programs are specified by statute and will be competed under the planned solicitation.

Defense Dual-Use Critical Technology Partnerships: This program will support the research and the development of critical technologies that both meet defense needs and have commercial potential. Each partnership under this program will include either two or more eligible firms or a nonprofit research corporation formed by two or more eligible firms. A partnership may also include a Federal laboratory or laboratories, Government-owned and operated industrial facilities, State government agencies, institutions of higher education, and other entities that support the activities of the firms or nonprofit research corporations.

Commercial-Military Integration Partnerships: This program will develop and mature dual-use technologies with clear commercial viability and potential military applications. Each partnership under this program will include one or more eligible firms and/or nonprofit research corporations. A partnership may also include a Federal laboratory or laboratories, State government agencies, institutions of higher education, and other entities that support the activities of a proposer.

Regional Technology Alliances Assistance Program: This program will support regional efforts to apply and commercialize critical dual-use technologies. These alliances will bring State, industry and Federal resources together to provide key infrastructure services to regional clusters of associated firms. The participants in a regional technology alliance must include one or more eligible firms that conduct business in the region served by the alliance and a sponsoring agency located in that region. The sponsoring agency (who submits a proposal under this program) must be an agency of a State or local government, a nonprofit organization formed by two or more State or local governments, a membership organization of which a State or local government is a member, or an institution of higher education.

Defense Advanced Manufacturing Technology Partnerships: This program will encourage research and development of advanced manufacturing technologies with the potential for a broad range of military and dual-use applications. Each partnership under this program will include either two or more eligible firms or a nonprofit research corporation formed by two or more eligible firms. A partnership may also include a Federal laboratory or laboratories, State government agencies, institutions of higher education, and other entities that support the activities of the firms or nonprofit research corporations.

Manufacturing Extension Programs: This program will assist small manufacturers in upgrading their capabilities to serve both commercial and defense needs. Modeled after the Agricultural Extension Service, this effort will build on manufacturing extension programs sponsored by regional, State, or local governments and private, nonprofit organizations.

Defense Dual-Use Assistance Extension Program: This program will assist businesses economically dependent on Department of Defense expenditures to acquire dual-use capabilities through a variety of assistance mechanisms. The Federal Government, regional entities, State or local governments, private entities, and nonprofit organizations may submit proposals as sponsors of such programs.

Manufacturing Engineering Education: This program will support the enhancement of existing programs and the establishment of new programs in manufacturing engineering education and training. Grants will be made under this program to institutions of higher education and consortia of such institutions teamed with eligible firms and other support entities. Grants will be made

under this program to institutions of higher education and consortia of such institutions. Eligible firms and other support entities may participate in this program.

Manufacturing Experts in the Classroom: This program will support teaching, curriculum development, and other activities of manufacturing experts with practical experience at institutions of higher education. Grants will be made under this program to institutions of higher education and consortia of such institutions teamed with eligible firms and other support entities. Assistance will be provided under this program to institutions of higher education. Eligible firms and other support entities may participate in this program.

2.2.2. Guidelines for Assembling a Team of Eligible Participants

In order to respond to the forthcoming solicitation, it will be necessary in most cases to assemble a team of eligible participants. The ultimate determinant of eligibility to participate in an activity funded under the program statutes is the language of those statutes. What follows are general guidelines for assembling a team of eligible participants; they should only be used as an initial guide for determining eligibility. All prospective participants should refer to the language of the statutes, which is summarized in Appendices B and F of this Program Information Package, for an explanation of the statutory requirements for creating a team.

Eligible Firms: In general, an "eligible firm" as defined by legislation (see Appendix F) is a company or other business entity that conducts a significant level of its research, development, engineering, and manufacturing activities in the United States. A firm not meeting this test may still be an "eligible firm" if its majority ownership or control is by United States citizens. In addition, a foreign-owned firm may be an "eligible firm" if its parent company is incorporated in a country whose government encourages the participation of U.S.-owned firms in research and development consortia to which that government provides funding if that government also affords adequate and effective protection for the intellectual property rights of companies incorporated in the United States. Determinations of eligibility of firms in this last category will be made by the Secretary of Commerce as mandated by 10 U.S.C. § 2491(9). No prior certification of eligibility will be issued or accepted, and the burden of establishing eligibility will ultimately rest on the proposer.

Eligible Proposer: Eligible Proposers are designated by the program statutes; designation varies by statutory program. Table 2 indicates Eligible Proposers by program with a shaded circle (●). Appendix B summarizes the statutory language concerning the eligibility of proposers.

Proposal Participants: Entities other than Eligible Proposers may be proposed as performers. These include, eligible firms, nonprofit organizations, State or local governments, Federal laboratories, government-owned contractor-operated industrial facilities, and other entities not listed in the statutes. Appendix B summarizes the statutory language concerning the eligibility of participants.

Activities must be proposed by an Eligible Proposer, but may include any other number of Participants.

Table 2
Eligible Proposers

Eligible Proposer	Def. Dual-Use Crit. Ptnshps.	Comm.-Mil. Integ. Ptnshps.	Reg. Tech. All. Asst. Program	Def. Adv. Mfg. Tech. Ptnshps.	Mfg. Extension Programs	Def. Dual-Use Asst. Ext. Prgm.	Mfg. Eng. Educat. Grant Prgm.	Mfg. Exprt. in the Classroom
Single Eligible Firm		●	●			●		
Two or More Eligible Firms	●	●	●	●		●		
Single Nonprofits					●	●		
Nonprofit of Two or More Eligible Firms	●	●		●	●	●		
Federal Government						●		
Federal Laboratory						●		
Govt. Owned and Oper. Indust. Facility						●		
State Govt. Agencies			●		●	●		
Local Govt. Agencies			●		●	●		
Nonprofit Estab. by Two or More States or Local Govts.			●		●	●		
Membership Org. Where State or Local Govt. a Member			●		●	●		
Existing Manufacturing Extension Programs of Regions					●	●		
Regional Entities					●	●		
Institutions of Higher Education			●		●	●	●	●

● Eligible Proposer.

NOTICES: THIS TABLE SHOULD BE REFERRED TO AS AN INITIAL GUIDE ONLY. REFER TO APPENDIX B FOR DETAILED INFORMATION OR TO THE PROGRAM STATUTES THEMSELVES.

EVEN IF YOUR ORGANIZATION OR ENTITY IS NOT AN ELIGIBLE PROPOSER, IT MAY PARTICIPATE UNDER OTHER CERTAIN CONDITIONS, OR TEAM WITH AN ELIGIBLE PROPOSER UNDER THESE PROGRAMS. FOR TEAMING POSSIBILITIES SEE APPENDIX B OR THE PROGRAM STATUTES THEMSELVES.

2.3. ALIGNING ACTIVITIES WITH STATUTORY PROGRAMS

Each offering will combine a proposed activity with a statutory program as a funding source. Activities have associated selection criteria (Appendix A); statutory programs have requirements (Appendix B). The following explains how to pair an activity with a corresponding statutory program. The filled circles in Figure 4 identify the activities emphasized by each statutory program. Proposers who wish to link multiple activities to provide an integrated solution for technology reinvestment will find guidelines for developing "associated proposals" in the formal solicitation.

To align activities with statutory programs and plan proposals refer to Figure 4 and follow these steps:

Step 1: Determine your Activity Area

Proposers will first determine the activity most appropriate to their proposal idea. Each activity has associated selection criteria. Refer to Appendix A.

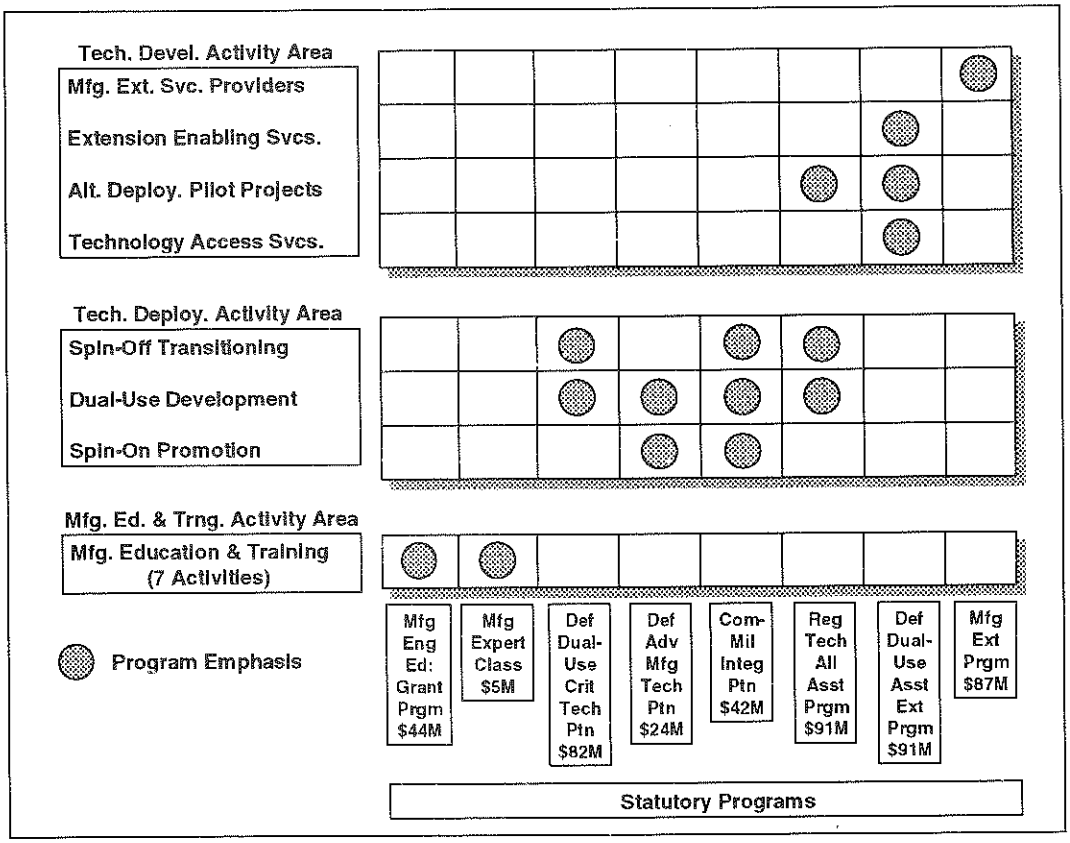

Figure 4: Activity Areas by Statutory Program—Activities are shown on the vertical axis and are grouped into three activity areas. Statutory programs are shown on the horizontal axis. Shaded circles direct activities to programs. In many cases, the proposer can choose from several programs for funding of an activity. In addition, the formal solicitation will contain instructions for "associating" related activities.

Step 2: Determine your Statutory Program

Once an activity has been chosen, determine which statutory program is most appropriate to meet the proposal's funding, organizational and management needs. Each program has corresponding statutory requirements (structural, management, eligibility of proposers, funding) which a proposal must satisfy. Refer to Appendix B. To determine proposer eligibility, Table 2 should be used as a guide. Refer to Appendix B.

Step 3: Government Interaction/Team Formation

The Government intends to be active in assisting with the formation of proposal teams prior to the date on which a solicitation is announced (expected to be May 14, 1993). Until then, interaction by potential proposers and the Federal agencies of the TRP (DoD, DOE, DOC, NSF, NASA) to investigate possible proposal teaming arrangements and proposal ideas is encouraged.

3. PLANNING FOR SUBMISSION OF PROPOSALS

This information is provided for planning purposes only and may be used to assist in preparing proposals to be submitted in response to a future solicitation.

Employees of the Department of Defense (DoD), Department of Commerce (DOC), Department of Energy (DOE), National Science Foundation (NSF), and the National Aeronautics and Space Administration (NASA) will evaluate and select proposals jointly. All Government employees are bound by statute 18 U.S.C. § 1905 not to disclose proprietary information. An indication that data is proprietary should be included where appropriate in top and bottom margins. The Government will not execute individual non-disclosure statements with proposers.

Non-government subject matter experts may be used in evaluations. Non-government employees having access to proprietary data will be required to execute a non-disclosure certificate. Any offeror unwilling to allow non-government employees access to its proposal will stipulate GOVERNMENT ONLY ACCESS on the outside of the envelope and on the proposal cover when the proposal is delivered so that the proposal may be handled separately.

In some cases a proposer may have multiple ideas that span several activities and/or statutory programs. The solicitation will describe how proposers may link individual proposals together into "associated proposals." Narratives explaining these linkages will be required.

3.1. PLANNED TECHNICAL PROPOSAL FORMAT

Technical proposals will be a maximum of thirty (35) pages long. It is left to the proposer to determine how best to use the thirty-five (35) pages allotted for the technical proposal. The following four sections are planned:

Section 1—Executive Summary: The first five (5) pages of the planned technical proposal format will be an executive summary of the entire technical proposal. This executive summary will be evaluated based on its merit before the remainder of the technical proposal and will be extremely influential in the early identification of high interest offerings.

Section 2—Body of the Proposal: The body of the proposal will give a detailed explanation of the technical approach, merit and benefits to be derived from the proposed activities, and the management plan.

Section 3—Statement of Work: A Statement of Work will be supplied that discusses the specific tasks to be carried out, including a schedule of significant events and measurable milestones.

Section 4—Selection Criteria Index: An index showing the pages on which each of the activity area selection criteria (Appendix A) and statutory requirements (Appendix B) are addressed will be required.

3.2. PLANNED COST/FUNDING PROPOSAL FORMAT

Cost/funding proposals will have no page length limit or page layout requirements and will address funding over a 12 to 24 month base period of performance, with additional 12 to 24 month options as necessary. Work Breakdown Schedules will not be required. Cost/funding proposals will be organized to include the following three sections, in order:

Section 1—Total Proposed Cost: This section will give a detailed breakdown of costs on a task-by-task basis for each task appearing in the Statement of Work.

Section 2—Cost to the Government: This section will specify the total costs to be borne by the Government and any technical or other assistance including equipment, facilities, and personnel of Federal laboratories required to support these activities.

Section 3—Fund Matching and In-Kind Contributions: This section will include: (1) the sources of cash and amounts to be used for matching requirements, (2) the specific in-kind contributions proposed, their value in monetary terms, and the methods by which their values were derived, and (3) evidence of matching fund availability.

APPENDIX A

PROPOSAL ACTIVITY AREA PLANNED SELECTION CRITERIA AND EXAMPLES

A.1. TECHNOLOGY DEVELOPMENT ACTIVITY AREA

Technology development activities deal with the creation and extraction of new and existing product and process technologies and exploration of their potential for commercial and/or defense applications. *It is intended that these activities will result in applied development, not basic research. Proposals that involve either basic research or final product development beyond the stage of product prototype/feasibility demonstration will be regarded as out of scope.*

Activity descriptions are contained in sections A.1.2, A.1.3, and A.1.4 of this Appendix. For examples of the types of activities that might be proposed see the description of existing DTCC member agency programs in Appendix D. Planned selection criteria applying to all three Technology Development activities (Spin-Off Transitioning, Dual-Use Development, Spin-On Promotion) are contained in Appendix A.1.1. **Statutory program selection criteria have been incorporated in total into these planned activity selection criteria and do not appear separately.** Technology Focus Areas are shown in the list below. These Technology Focus Areas identify technologies appropriate for Technology Development activities.

Technology Focus Areas

Eleven broad areas have been identified as key dual-use technologies for development in the Technology Development activity area. Within these broad areas, specific topics have been identified that are judged to meet critical defense needs as well as having significant potential to stimulate commercial product development. While other technology areas were considered, the topics described below were judged to have the highest priority based on future growth potential, military need and commercial opportunities. These topics are not to be considered exclusive; the Government will entertain ideas in other areas.

(1) **Information Infrastructure**—Communication networks and information services make up the information infrastructure. This infrastructure is necessary to support a wide range of defense and commercial applications that include command, control and intelligence, manufacturing, health care, education and environmental monitoring, to name only a few. Some specific topics of information infrastructure that are of interest in this solicitation include the following:

- **Network Architecture**—There is a need for a reference architecture for the network of the future that integrates various communication media (fiber, cable, satellite, radio), which will scale as networks grow. Network vulnerability issues need to be addressed, along with guidance to minimize these risks. Key concepts will be demonstrated experimentally.
- **Wireless Communications**—Wireless communications provide untethered connectivity, based on RF or IR technologies, between mobile/rapidly deployable computer systems and the more traditional fixed communications network infrastructure. Topics of potential research include private/secure wireless communications, high bandwidth wireless communications, rapidly deployable wireless communications infrastructure, terahertz fiber optics broadband transmission, integration of wireless/wireline communications networks, and microcellular wireless system design.

- **Software Development Methods, Tools and Environments**—There is a need to increase productivity and quality in the development, maintenance, and evolution of large-scale software systems, and to enable the rapid development of new information services. Opportunities exist in the following topics: framework/integration technology for software engineering, software process technology, tool integration, and collaborative development of software.
- **Heterogeneous Data Bases**—This topic assesses heterogeneous data systems and develop the technology and conventions that will allow end-users to exploit information that resides in heterogeneous databases (both modern and legacy) and object data repositories, as well as data that is or can be made available from commercial and business resources. The formats will differ for textual data, business data records, engineering information (including drawings), images (including processed satellite data), and sound (including processed voice messages). Mechanisms must accommodate access to public and governmental data as well as data that is provided as a commercial service.

(2) **Electronics Design and Manufacturing**—Competitive organizations require the ability to acquire small quantities of leading-edge custom electronics components at affordable costs. This program will develop selected design and manufacturing technologies to meet these goals. Specific topics of interest include:

- **Process Control for Electronics Manufacturing**—Process control is the integration of in-situ sensors, control algorithms, and process models and their application to critical manufacturing processes to achieve a real-time process control capability significantly beyond that possible today. By creating a partnership across a broad user base in electronics and materials, this effort will define common directions for and fund the development and commercialization of the component technologies for process control—sensors, controls, modeling, and integration.
- **Multi-Chip Integration**—With Multi-Chip Module (MCM) technology, dozens of bare silicon chips can be interconnected into a single package which is often no larger than the conventional package used for a single complex integrated circuit. Current utilization of MCM technology is limited by cost, availability, and perceived risks. The purpose of this effort is to produce order of magnitude reductions in manufacturing cost and risk, and to accelerate the acceptance and insertion of the technology. Potential topics in this program could include developing manufacturing equipment, materials, and processes for low-cost, high volume, flexible MCM manufacturing.
- **Optoelectronic Module Technologies and Manufacturing**—Novel techniques to package optoelectronic components into compact, efficient modules and the manufacturing techniques to make this process low cost are necessary. The packaging techniques include integration of transmitter arrays, receivers, multiplexers, and optical fibers into one module. The manufacturing technologies include precision assembly and passive alignment for micro-optical components and lift-off, flip-chip, and selective-area growth techniques to combine components made from different materials.

(3) **Mechanical Design and Manufacturing**—The objective of this effort is the design and manufacture of electro-mechanical systems requiring forming and assembly. While this is a broad area, some specific subareas for research include the use of advanced information support for design and manufacturing, use of flexible robotic systems, integrating the description of the component/system to be manufactured with the manufacturing process, and selected areas in forming and assembly. Specific topics of interest include:

- **Integrated Design Systems**—Design environments and tools are needed to support the development of products from concept to fielding. These include the engineering frameworks, integrated product and process descriptions, and analysis tools to support the designer.
- **Precision Machine Tools and Robotics**—Precision machine tools and robots are needed that significantly increase the accuracy and repeatability of commodity-grade machines. These tools and robots need to be demonstrated and integrated with design systems for flexible manufacturing.
- **Optical Components Manufacturing**—Computer-aided manufacturing techniques are needed that will automate the design and production process of optical components. Two specific optics technologies need to be addressed: (1) refractive optics—lens (spherical, aspherical, toroid and prism), and (2) binary optics for advanced components and integration with microelectronics.
- **Precision Laser Machining**—This effort will develop flexible laser tooling for precision cutting/drilling, welding and surface treatment of high strength metal alloys and composites for aerospace, propulsion and platform systems, automotive, ship building, and heavy industry applications.

(4) **Materials/Structures Manufacturing**—Maintaining our technology leadership position in the use of advanced materials/structures is vital to U.S. competitiveness. The reduction in DoD demand for advanced materials such as composites, without some compensating growth in civilian demand, threatens the existence of the U.S. advanced materials industry. The goal is to broaden the military use of advanced materials and to implement programs to transition these technologies into civilian use. This can be accomplished by: (1) product oriented computation and modeling, (2) affordable processing and manufacturing, and (3) insertion of advanced materials (replacing standard materials) into components or systems to improve performance or reduce cost. Specific areas of interest include:

- **Advanced Composites**—Materials of interest are polymer matrix composites (PMC), metal matrix composites (MMC), carbon-carbon composites (CCC), ceramic matrix composites (CMC) and adaptive (smart) composites and structures. The composites can be reinforced with fibers, particulates, or whiskers or can be laminates. PMC structures range all the way from aircraft engine components to bridges and land vehicles.
- **Innovative Forming Technologies**—Technologies of interest include: (1) intelligent processing of structural materials incorporating process modeling, in-situ sensing, and advanced multivariable feedback controls, (2) solid free form fabrication focused on functional prototypes, and (3) processes that result in near net shape products.

(5) **Health Care Technology**—The use of advanced information and electronics technology and advanced diagnostic capabilities can lower the cost of administering the health care system and save lives by providing for more timely care. These technologies apply to both the defense and civilian health care systems. Specific areas of interest include:

- **Health Care Information Systems**—Administrative costs consumed nearly 20 percent of the $800 billion dollar health care bill in 1992. Information and networking technologies can be used to simplify and make more efficient the processing of health care information. This includes the electronic submission of claims to health care insurance carriers, the development of electronic patient records, and the collection of information to monitor health care costs and effectiveness.

- **Trauma Care**—There is a need for timely medical information to support decisions at the injury scene/battlefield to plan and manage overall responses. Survival rates decrease dramatically if treatment is delayed for more than one hour. Advances in biomedical sensor technology, coupled with the timely capture and distribution of clinical information using network technology, offer the potential to enhance emergency/combat care delivery and to allow reduced costs via earlier discharges and at-home monitoring. This requires advances in both diagnostic capability and the tools for intervention. There is a need for non-invasive sensing of vital signs and body chemistry which can acquire information continuously, even prior to injury or illness, and transmit this information to a distant medical monitoring facility; miniaturized, mobile, bedside, solid-state "stat labs" for patient monitoring to improve reliability and immediacy of analysis; and advanced, mobile, low-powered medical imaging devices that provide for field/remote use.

(6) **Training/Instruction Technology**—There is a need to develop the software tools necessary to integrate the most promising information technologies for computer-mediated instruction, and to apply them in a pilot program in military/industrial training. Specifically, the following areas are considered the most promising in order to develop the next generation of learning programs:

- **Digital Libraries**—Creation of digital library databases, populated specifically for the pilot program, and development and demonstration of intelligent tools that enable users to rapidly browse or search the databases.

- **Authoring Tools**—Development and demonstration of new generation authoring tools that will enable teachers and trainers to develop high-quality, computer-mediated training material. The resulting training material should use multimedia and be dynamically adaptable to the needs of individual students.

(7) **Environment Technology**—There is an increased awareness and concern for the environment as a consequence of our manufacturing, operation, and maintenance activities. There are also increased market pressures resulting both from domestic regulatory constraints and growing foreign legislative and recycling policies. Traditionally, efforts have focused on limiting the impact of hazardous products once created, and have been inadequate to meet national needs. A top-down or systems approach is needed where the environmental demands are considered from a product life-cycle perspective. Additionally, there is a need to be able to continuously monitor the environment to provide the necessary data for policy and investment decisions. Specific areas of interest include:

- **Environmentally Conscious Electronic Systems Manufacturing**—The electronics and computer industry, including computers, communications, semiconductors and consumer electronics, is the largest manufacturing employer in the U.S. Manufacturing by-products of the electronics industry and the disposition of electronic products are raising increasingly important technical and financial issues, and there is a need to improve processes, materials and manufacturing equipment to control production of hazardous waste material and to be able to recycle the products. Efforts already underway with SEMATECH are addressing these issues for the semiconductor industry. Environmentally conscious manufacturing is needed for electronics packaging, printed wiring boards, assemblies, and displays.

- **Environmental Monitors**—There is a need for sensing technologies and sensor processing to produce high resolution mapping and to detect and monitor a variety of environmental conditions, including pollutants, contaminants, and hazardous materials. Sensing technologies include seismic, acoustic, electro-magnetic, thermal, chemical electro-optical, and infrared. Mapping and monitoring systems could be deployed in unattended arrays or aboard ground, air, or maritime vehicles. Monitoring systems must be affordable and have low operating costs.

(8) **Aeronautical Technologies**—The United States enjoys a dominant position in the world aircraft market because of the distinct technological advantage won by an aggressive R&D investment strategy, especially in the Defense sector. However, this preeminence is now being aggressively challenged by both Europe and Asia. Aeronautical technology investments that can provide significant Defense and commercial payoffs include the following:

- **Propulsion/Engine Technologies**—There is a need to focus the experience and technology of DoD and its contractors to develop technologies that enable affordable composite manufacturing and that attack the key cost components of integrating composite components into propulsion system manufacturing processes. This effort will address the integration of select composite assembly approaches and component design with advanced low cost manufacturing processes. The ultimate goal is to demonstrate manufacturing methodology and qualify a production plan for advanced composite propulsion systems.

- **Fly-By-Light**—There is an opportunity to develop dramatically lighter, more capable aircraft avionics, especially aircraft and propulsion controls, actuators, and sensor systems by exploiting advanced optical technologies. Optical technology-based "fly-by-light" capability will overcome the electromagnetic interference problem that plagues fly-by-wire systems while providing a discriminating cost, weight, and performance advantage. The effort will coordinate systems design with manufacturing and integration processes to achieve the lower cost, affordable flight and engine control systems, as well as sensor systems, actuators, and controllers.

- **Structures**—There is an opportunity to increase productivity and lower unit production costs of aircraft manufacturing by developing low-cost fabrication and structural concepts using advanced materials. High payoff opportunities for significant unit cost reductions are in areas of advanced materials placement and molding processing, assembly and joining processes, and tooling and equipment demonstrations, as well as innovative manufacturing processing of titanium and advanced metallic structures.

- **Aircraft Design**—There is a need to develop and demonstrate aircraft systems design and integration tools which will reduce the design process time and provide a coherent integrated design methodology with the manufacturing processes and logistics infrastructure. Activities in this area will improve and accelerate the application of information, computational, and technical communication tools required to enable simultaneous trades of cost and performance considerations. Exploitation of advanced approaches including virtual reality, software engineering, and innovative CAD/CAM technologies are envisioned, with the goal being to have one or more advanced design teams design a large transport aircraft.

(9) **Vehicle Technology**—Future vehicles will use environmentally clean sources of energy, will exploit the use of new materials, and will contain advanced sensors and electronics for improved vehicle performance as well as contributing to future intelligent highway systems. These vehicles will benefit both defense and commercial sectors, and can draw on a wide range of past investments in defense research. Specific opportunities include:

- **Alternate Power Sources**—Alternative power sources are needed that can provide greater energy density and faster replenishment, and that can be manufactured efficiently. Candidate sources include batteries, flywheels, fuel cells and auxiliary power units that can operate in a hybrid mode.

- **Sensors and Electronics for Vehicle Systems**—This effort includes electronic sensing systems for improved safety, reliability, and efficiency of vehicles. Applications include vision assistance and collision avoidance, guidance sensors, and traffic and road condition monitors. These

sensors must be low-cost and highly reliable. While the focus here is on the vehicle application, some of these sensors and enabling electronics are expected to have utility in other applications.

- **Vehicle Integration**—Many system issues need to be addressed in developing vehicles which employ alternate/hybrid power sources and the next generation of vehicle sensors and electronics. These include developing efficient power trains, regenerating energy from braking, and developing safer vehicles through the use of on-board sensing.

(10) **Shipbuilding Industrial Infrastructure**—While the international shipbuilding industry is booming, the nation's shipbuilding industry is on the verge of collapse. The U.S. shipbuilding industry has been assisted by large DoD shipbuilding efforts for many years. Current and projected Navy combatant/auxiliary ship construction is insufficient to maintain the industrial shipbuilding capacity required for mobilization. This effort is intended to assist the U.S. shipyards and related industries to become competitive in international commercial markets and thereby preserve a viable shipbuilding infrastructure for Defense. The effort will address innovative ship design and construction processes and ship systems technologies such as propulsion and auxiliary systems.

(11) **Advanced Battery Technology**—This effort will develop battery technology with greater energy density that can be used in man-portable applications. Continuous thin-film manufacturing techniques for lithium/polymer batteries that are safe, rechargeable, and less expensive than batteries now available in military or commercial use are of particular interest.

Other areas of potential interest include textile processing and food processing where innovative ideas can be exploited to reduce the cost of military products and lead to more competitive industrial capabilities.

Match Requirements

Statutory requirements for cost sharing differ among the technology development programs. "Commercial-Military Integration Partnerships" requires at least 50% non-Department of Defense funding in the first year, 60% in the second year, and 70% in the third and later years. "Regional Technology Alliances Assistance" requires at least 50% non-Department of Defense funding in each year. "Defense Dual-Use Critical Technology Partnerships" and "Defense Advanced Manufacturing Technology Partnerships" each require at least 50% non-Federal funding in each year.

The kinds of cost sharing that may be permitted (e.g., cash, in-kind, IR&D) are discussed in Appendix G.

Term of Awards

Technology development proposals should include budgets with a base term of 12 to 24 months and with optional additional terms of 12 to 24 months each. The government may fund both base term and options from the present appropriation, depending on the content of the proposal, the availability of funds, the fit with other programs, or any other considerations. The government may exercise options from later appropriations or other sources.

Reporting Requirements

Recipients of awards for Technology Development will be required to provide quarterly and annual technical reports, an annual audit report performed by a commercial Certified Public Accountant, and financial reports to accompany each request for payment.

Planned Orals, Interviews, and Site Reviews

During the proposal review and selection process, finalist proposers may be asked to give oral presentations to members of the selection panel or staff, or to travel to Washington or other locations for an interview. The TRP also reserves the right to conduct site reviews.

A.1.1. TECHNOLOGY DEVELOPMENT PLANNED SELECTION CRITERIA

The selection criteria contained in this section apply to all three Technology Development activities: (1) Spin-Off Transitioning, (2) Dual-Use Development, and (3) Spin-On Promotion. They also incorporate all statutory selection criteria for the TRP programs. Each proposal must address these selection criteria which are grouped into four equally weighted categories: Scientific and Technical Merit, Technical Approach and Management Planning, Pervasive Impact, and Commitment to Productization.

(1) Scientific and Technical Merit

(a) Technical quality and innovation of the proposed activity, including uniqueness with regard to the state-of-the-art and industry practice. Applicants shall compare and contrast their approaches with those taken by related and similar federal efforts to assure lack of undesirable duplication.

(b) Feasibility of the project consistent with its proposed cost. Offerors must demonstrate both knowledge and appreciation for areas of technical risk. High risk is acceptable where it is justified by high potential payoff (Pervasive Impact, below) and where the management plan clearly addresses an approach for the mitigation of that risk (Technical Approach and Management Planning, below).

(2) Technical Approach and Management Planning

(a) Clarity of technical objectives and quality and coherence of the technical plan. Project plans should be based on well-defined objectives, milestones, and deliverables.

(b) Quality and appropriateness of the technical staff assigned to carry out the proposed activities.

(c) Adequacy of the proposer's management plan in addressing the need for facilities, equipment, design and manufacturing tools, and other technical, financial, and administrative resources by proposers and participants to accomplish proposed activity objectives.

(d) Adequacy of proposer's plan for ensuring the protection of intellectual property by the participants.

(3) Pervasive Impact

(a) Compelling benefits to national security (as defined in the broad context of both application to defense capabilities and enhancement of the U.S. industrial base) of the proposed activity. Compelling benefits of a technological development are:

(i) The creation of new firms (particularly in the Regional Technology Assistance Alliances Program) and of long-term, high quality jobs,

and one of the following:

(ii) Demonstration of viability in a commercial market for a technology developed for defense purposes (spin-off).

or

(iii) Very significant increase in the affordability of defense systems meeting reconstitution or other defense needs through either a great reduction in the cost of manufacturing or by utilization of a technology developed by the commercial sector (spin-on),

or

(iv) Provision of both a new, influential defense capability and a new commercial product or process (dual-use).

(b) Elimination or reduction of health, safety, and environmental hazards, especially in the development or improvement of manufacturing processes.

(c) The potential, particularly in the Regional Technology Alliances Assistance Program, to be able to apply critical technology research and development supported or conducted by Federal laboratories and institutions of higher education to advance the national security interests of the United States.

(4) **Commitment to Productization**

(a) Evidence that the proposed activity will be commercially sustained within five years, without further Federal funding. This may be demonstrated by a convincing assessment of availability of timely private sector investment for continuing development activities or for productizing the results of a successful development activity. There must also, however, be a demonstrated need for Federal funding to initiate activity because of the likelihood that there will not be timely private sector investment in other activities to achieve the goals and objectives of the proposed activity.

(b) Evidence of effectiveness of the participants in similar kinds of activities, including technology commercialization. In the case of new ventures, previous performance of the participants separately and/or the key staff will be examined.

(c) Adequacy of system-integration and multi-disciplinary planning, including integrated development (concurrent engineering) of appropriate downstream production, manufacturing, quality assurance, cost, and end-use requirements and factors.

(d) Appropriate structure of the activity (vertical integration, horizontal integration, or both) to include participants who possess all of the necessary skills and who offer the appropriate financial involvement for achieving subsequent productization. Where applicable (in particular for the Regional Technology Alliances Assistance Program), proposers must show appropriate participation of Federal, State, local, private, and nonprofit entities and institutions of higher education.

A.1.2. SPIN-OFF TRANSITIONING

Activities will emphasize the use or incorporation of existing Department of Defense technologies where their application by non-defense companies will be of value. The primary purpose of Spin-Off Transitioning is to make use of existing government owned or developed, dual-use product and process technologies to improve U.S. economic performance and productivity across a broad spectrum of industrial sectors and enterprises. The application of dual-use technologies to non-defense pursuits which result more affordable defense systems, and development of existing defense technologies which establish a feasibility for competitive commercial products and processes, will be encouraged.

A.1.3. DUAL-USE DEVELOPMENT

Activities will stress the development of new technologies with explicit consideration of dual-use applications. The extent to which a project advances and enhances national security objectives, improves defense mission performance capabilities, results in more affordable defense systems, and offers commercially viable, non-defense products or processes will be emphasized. Improvement of U.S. economic performance and productivity across a broad spectrum of industrial sectors and enterprises will also be considered. Commercially viable technology development that has pervasive impact in both non-defense and defense areas is central to this activity.

A.1.4. SPIN-ON PROMOTION

Activities will seek to exploit non-defense, commercial technologies with potential defense applications and demonstrate their use in support of defense missions. Primary interest is in the increased affordability of existing and planned defense systems, including design, engineering, development, production, logistics support, life-cycle support, training, adoption of commercial standards, and cost reduction gains from economies of scale in production.

A.2. TECHNOLOGY DEPLOYMENT ACTIVITY AREA

The eight planned selection criteria listed in this section apply to all four Technology Deployment activities: (1) Manufacturing Extension Service Providers; (2) Extension Enabling Services; (3) Alternative Deployment Pilot Projects; and (4) Technology Access Services. They incorporate all the corresponding program statutory selection criteria. These eight planned criteria will be applied with equal weight in evaluation of proposals. In applying these criteria, special selection factors that are specific to each particular activity will be used in interpreting the criteria. These special selection factors are listed in their corresponding activity sections.

A description of each activity and examples of the types of proposals that may qualify under these activities appear below.

Match Requirements

Statutory requirements for cost sharing in the two technology deployment programs are different. "Defense Dual Use Assistance Extension Program" requires at least 50% non-Department of Defense funding in the first year, 60% in the second year, and 70% in the third and later years. For other statutory programs, the proposer must provide at least 50% non-Federal cost-share.

The proposers cost share can consist of cash and in-kind contributions as described in Appendix G. Proposals for Federal funding of $1 million per year or more should have at least half of their cost share in cash. Smaller proposals can have a higher proportion of in-kind cost share provided that the proposers contribution is well focused and substantially advances the objectives of the proposal.

Term of Awards

Future technology deployment proposals should be presented with budgets for a base term of one year with optional additional terms as required, shown in one-year increments. The Government may fund both base term and options from the present appropriation, depending on the content of the proposal, the availability of funds, the fit with other programs, or any other considerations. The Government may exercise options from later appropriations or other sources.

Reporting Requirements

Recipients of awards for Technology Deployment will be required to provide quarterly and annual technical reports, an annual audit report performed by a commercial Certified Public Accountant, and financial reports to accompany each request for payment.

Planned Site Visits and Interviews

During the proposal review and selection process, finalist proposers may be asked to host a site visit by members of the selection panel or staff, or to travel to Washington or other locations for an interview.

A.2.1. TECHNOLOGY DEPLOYMENT PLANNED SELECTION CRITERIA

The selection criteria contained in this section apply to all four technology deployment activities. They also incorporate the statutory selection criteria for the TRP programs. Each proposal must address these selection criteria. Selection criteria for technology deployment are grouped into eight equally weighted categories. *Special selection factors in Sections A.2.2, A.2.3, A.2.4, and A.2.5 amplify the eight existing criteria and are not additional criteria.*

(1) Target Population

The proposal should target a clearly defined population of beneficiary companies or organizations, and should clearly identify the needs which the proposal addresses. The target population should include a significant number of United States-based small manufacturing firms and/or companies dependent upon Defense expenditures, and should be large enough to justify the proposed expenditure. The approach set forth in the proposal should be reasonable for the needs identified and the defined population. Factors that will be considered include:

(a) Demonstration of a clear definition of the target population, its size, needs, and demographic characteristics.

(b) Demonstration of an understanding of the needs of the target population.

(c) Appropriateness of the plan to address the identified needs of the target population.

(d) Appropriateness of the size of the target population and the anticipated impact for the proposed expenditure.

(2) Defense Conversion, Dual-Use Impacts

The proposal must provide a substantial impact in advancing defense conversion objectives. It should specifically address the needs of defense suppliers and their subtier suppliers. It should increase competitiveness, number of jobs, and quality of jobs. Factors that will be considered include:

(a) Degree to which the planned approach will serve a substantial number of defense suppliers and their subtier suppliers.

(b) Effectiveness of the proposed approach in increasing competitiveness, number of jobs, and quality of jobs through the target population particularly among displaced defense workers.

(c) Degree to which the proposed approach can serve to convert businesses and their workforces from defense-dependent to capabilities having both defense and non-defense commercial applications.

(3) Technology Sources

For proposals that focus on work directly with small businesses, the proposal should demonstrate that the proposer has adequate access to the technology needed to provide sound service. This access is through a combination of in-house expertise and experience, partnerships with technology sources, and linkages to external technology sources. It is the linkage and understanding of how to gain access to technology that is most important.

Proposals to extract technology will be based on existing core competency, not on an intent to develop in-house expertise. The proposal must set forth a convincing plan for identifying the needed technology within an organization and for "extracting and packaging" the technology. Special factors for each activity expand on these criteria.

(4) Delivery Mechanisms

The proposal must set forth a clearly defined, effective mechanism for delivery of services to the target population. For extension service providers, this refers to the means for working directly with target companies. For technology sources, this calls for well thought-out plans for formation of linkages to the organizations that work directly with companies. Special factors for each activity expand on these criteria. Factors that will be considered include:

(a) Effectiveness of proposed delivery mechanism.

(b) Demonstration of capacity to form the effective linkages and partnerships necessary for success of the proposed activity.

(c) Adequacy of plans to handle intellectual property issues.

(d) Technical quality of the proposed approach, including knowledge and use of best industrial practices.

(5) Management Experience and Plans

The proposal must set forth plans for proper organization, staffing, and management of the activity and must demonstrate that the leadership of the activity has a strong, current experience base to assure success. Special factors for each activity expand on these criteria. Factors that will be considered include:

(a) Appropriateness of the organizational approach for carrying out the proposed activity.

(b) Quality and depth of experience of the proposed leadership and the organization within which they will work.

(c) Soundness of staffing plans, including recruitment, selection, training, and continuing professional development.

(d) Thoroughness of evaluation plans, including internal evaluation for management and control, external evaluation for assessing outcomes of the activity, and "customer satisfaction" measures of performance.

(e) Presence of a governing or managing entity with clear responsibility for performance of the proposed activity.

(f) Evidence of significant involvement and support by private industry.

(6) Funding, Budget, and Cost Share

The proposed spending plan must reasonably match the proposer's projected activities. The proposal must contain a reasonable and practical plan for obtaining the cost share; i.e., that part of the budget not covered by the requested federal funds. Special factors for each activity expand on these criteria. Factors that will be considered include:

(a) Reasonableness of the budget, both income and expenses.

(b) Strength of commitment for proposer's cost share.

(c) Effectiveness of management plans for control of the budget.

(d) Appropriateness of in-kind contribution.

(e) Adequacy of plans for out-year funding

(7) Accessibility of Services and Documentation

Fair access to the services defined in the proposal must be available to all members of the target population. For pilot projects especially, and all projects in general, there must be plans for broadly disseminating the results of the proposed activity. Special factors for each activity expand on these criteria. Factors that will be considered include:

(a) Adequacy of plan for handling requests for diverse services.

(b) Strength of plan for documenting, evaluating, and disseminating information on new approaches taken and on outcomes of activities.

(8) Coordination and Elimination of Duplication

It is desired to minimize the creation of services and technology sources which duplicate, overlap, or conflict with existing resources. The proposer must demonstrate an understanding of existing organizations and resources within its environment and establish working linkages where appropriate. If there is a comprehensive state plan for technology transfer and extension, the proposer should document that its plan is consistent with the state plan. Special factors for each activity expand on these criteria. Factors that will be considered include:

(a) Understanding of existing organizations and resources related to the proposed target population.

(b) Adequate linkages and partnerships with existing organizations.

(c) Consistency with comprehensive state plans if such plans exist.

(d) Planned activity which does not duplicate existing resources.

A.2.2. MANUFACTURING EXTENSION SERVICE PROVIDERS

This activity will build on manufacturing programs that work directly with small manufacturers (fewer than 500 employees). The goals include increasing competitiveness through technical and management advancement, with support for improvement of business practices, assistance in accessing training and consulting services, and the transitioning of technologies from research to commercially viable products and processes. Extension services will also seek to stimulate the adoption of advanced technologies and techniques to improve both products and manufacturing processes, including activity-based accounting, concurrent engineering, and new management problem solving techniques. Examples of existing extension service providers are the NIST Manufacturing Technology Centers, Manufacturing Outreach Centers, and State Technology Extension Programs. Other forms or types of extension services

will be considered based upon their relevance to the specific needs of small manufacturers and other eligible enterprises, including technical need and geographic concentration.

Proposers should identify and make use of existing resources in their planning, avoiding the creation of duplicate resources or uncoordinated delivery approaches. There is already a substantial public investment in programs and organizations established to address the needs of small manufacturers; e.g. state-based centers programs like the Pennsylvania Ben Franklin Partnership and Ohio Edison program; community college-based Advanced Technology Centers; university-based state industrial extension programs like those of Georgia, Tennessee, and Maryland; federally funded centers programs like the Manufacturing Technology Centers; industry-state programs like the California Supplier Improvement program; and many more Federal, State, university, and non-profit approaches. There is also a major public investment in sources of technology which are available to service providers; e.g. national laboratories, NASA Field Centers, NIST laboratories, Centers of Excellence and laboratories, universities, the National Technology Transfer Center, National Technical Information Service, and many more.

Individual proposals can be regionally based or industrial sector based. In the former case, the proposer should describe the intended service area and balance the scale of the proposal with the concentration of manufacturers within that area. In the latter case, the proposer should describe how the services will be made available to distant small manufacturers.

Special Selection Factors

The following are additional selection factors for this activity that clarify and focus the general planned selection criteria.

(1) **Technology Source:** amplifying factors that will be considered for extension service providers include:

(a) Adequacy of in-house technical expertise and plans for utilizing it.

(b) Adequacy of plans for identifying sources of technology outside proposer's organization.

(c) Effectiveness and completeness of established partnerships and linkages for access to technology.

(2) **Delivery Mechanism:** amplifying factors that will be considered for extension service providers include:

(a) Adequacy of plans for working directly with target firms.

(b) Adequacy of plans for forming linkages and partnerships to provide the full range of services required by the target population.

Examples of Possible Activities to be Proposed

(1) **Major center in a region of industrial concentration.** Proposal to establish HLB service provider submitted by a nonprofit corporation founded to restore manufacturing strength in its region. Total operational budget of HLB is $6 million per year after a one-year start-up at the level of $3 million. Matching funds (50% of budget) provided entirely in cash, initially from the state and in out years by a combination of state funds and earned revenues. Serves a population of 7,000 small manufacturers within approximately one hour driving time of the location. HLB is affiliated with major universities in the region, with the state program in its state, and with community colleges for contract training. Has no industrial sectoral focus, serving all small manufacturers in the region. Services include software and hardware demonstrations, field agents, assessments of need, links to lenders to help client firms finance technology improvements, teaching factory and shared manufacturing functions, improved access to consultants, etc.

(2) **Small center in a start-up role associated with a larger organization.** Proposal to establish DJR service provider submitted by a state-chartered organization founded by the legislature to increase the number and quality of manufacturing jobs across the state. Total operational budget of DJR initially is $1 million, but the proposer contemplates returning with a future proposal in a subsequent competition for a larger program, once the groundwork has been laid and linkages have been formed. DJR will draw upon technology and management expertise of a large existing manufacturing extension organization JLC in a neighboring state and proposes that JLC be funded at $100,000 per year for its services. DJR has existing facilities, organizational structure, and some equipment. DJR proposes $200,000 per year in cash from the state and $300,000 per year in-kind for its 50% match. The initial service region is one major city, with 700 firms, and growth plans include the whole state with 4,500 firms.

(3) **Freestanding center in an area of local industrial concentration.** Proposal to establish MSN service provider submitted by a community college Advanced Technology Center (ATC) located in a pocket of 650 manufacturing firms situated within a one hour drive of the campus. The ATC has good physical facilities, computer systems, software, and manufacturing shop floor equipment. They have been working with companies, performing assessments, doing specific projects, providing training, functioning as teaching factories and shared manufacturing facilities, and they have been successful at it. They could serve their 650 companies with the facilities on hand, but lack the operating funds. Propose federal funding of $500,000 matched by $150,000 in earned income and $350,000 in-kind for facilities and equipment and salaries already paid. MSN will draw heavily on the expertise of the university-based industrial extension program of its state and on significant in-house expertise in selected areas. They need other sources of technology and seek appropriate linkages.

(4) **Sector specific.** The research and industry trade organization affiliated with an industrial sector which is broadly spread across the country proposes to address the most significant three major problems facing the industry as identified in the proposal. A successful solution to the problem would involve assistance to individual companies to implement new technology that would provide for rapid product definition, manufacture, and shipment to the customer. The proposer will furnish 40% of the budget in cash from member dues, with 10% in-kind for equipment and buildings. The proposal runs for three years and asks for $3 million per year of federal support.

(5) **Satellite to a larger service provider.** A large service provider RHW in one state has been asked to provide services in a neighboring state. RHW submits a proposal to establish a "satellite" operation in the neighboring state. The neighboring state will provide 50% match for the funds spent in its state. RHW uses 10% of the budget for management and technology sourcing to the satellite, and the remaining 90% is used at the satellite for direct service. A satellite with an annual budget of $600,000 is proposed. Linkages with other sources of technology are principally through RHW.

(6) **Industrial extension.** A state with a strong university-based industrial extension service proposes to establish four regional offices in the major manufacturing areas of the state. With this system in place, linked by the existing state infrastructure, all of the small manufacturers in the state will have access to the services. The annual budget is $3 million, of which the state will provide $750,000 in cash, $500,000 will be earned in fees, and $250,000 will be provided in-kind; $1.5 million of federal funding is requested. The system will be coordinated by the head of the industrial extension service.

(7) **Regional assistance programs.** A proposal from a team that represents a state economic development group, a university extension center or a national laboratory, with the intent to assist small and mid sized regional manufacturing operations with questions related to environmental issues or manufacturing related technologies. Matching funds would be provided by a combination of State support and fees collected from client firms.

(8) **State-based Industrial Extension.** A state which has decided to develop a state industrial extension program proposes to undertake planning and the first stages of implementation. The plan will set forth a strategy for the state in manufacturing extension and will describe state components that will be put in place for successful implementation. The proposal requests $150k for a one-year planning effort and an optional $300k for the first year of implementation following completion of the plan. The state will match the planning effort by providing full-time state employees to participate in the activity.

A.2.3. Extension Enabling Services

Currently much of the integrating activity and technology sharing in manufacturing extension is carried out by face-to-face interaction among small groups of participants. In the scale-up to a substantial national deployment system, specific technology-based programs are required to serve the integrating purpose for larger numbers of participants. As a national deployment system grows to provide technical assistance to small defense dependent manufacturing firms, there is a need to establish services that support the integration of service providers, technology sources, and others, including the NIST Manufacturing Technology Centers (MTCs), Outreach Centers, and recipients of State Technology Extension Program funding; DoD Centers of Excellence; National laboratories; extension service providers; and alternative mechanisms envisioned here. The types of integrating services envisioned include access to network services for communications and referrals among the subject organizations, professional development and training of staff members to ensure a continuing high quality of service, specialized access services that connect extension centers to sources of technology expertise and experience, centralized access to benchmarking and evaluation services, development of an evaluation infrastructure for the nationwide system of service providers, development of intellectual underpinnings for a national program of manufacturing extension, and a variety of means for information dissemination and professional interchange. Proposers are encouraged to focus on pilot development and testing of elements of this integration function. Some of these services will become self-sustaining, some will receive continuing funding for public-purpose activities, and some will be performed as government functions.

Special Selection Factors

The following are additional selection factors for this activity that clarify and focus the general planned selection criteria.

(1) **Technology Source:** amplifying factors that will be considered include:

(a) Strength of existing core competency in the proposed area of activity.

(b) Adequacy of plans to identify technology within the proposer's organization and to extract and package it for use by others.

(2) **Delivery Mechanism:** amplifying factors that will be considered include:

(a) Adequacy of plans for identifying in-house or external sources of technology to meet the needs of target population.

(b) Strength of plans to establish linkages with service providers and demonstrated success in forming and maintaining such linkages.

(3) **Management Experience and Plans:** Proposals should identify, treat, and resolve issues regarding selection of beneficiaries of the project. There should be a demonstrated valid public purpose in the distribution of benefits. The approach will not create an unfair technological or competitive advantage for one company or group of companies.

(4) **Accessibility of Services and Documentation:** The proposer's plan will specify the process for documenting the pilot project, analyzing its results, and publishing the analytical case study to help others replicate, modify, or avoid the approach.

(5) **Coordination and Elimination of Duplication:**

(a) The proposal must demonstrate the extent to which the proposed approach makes use of existing technology resources and service providers, and the extent to which the proposer demonstrates an awareness of other pilot projects with the same structure.

(b) The impact of the proposed approach, if successful, will be large enough to justify the investment. There should be some demonstration that the approach can be replicated elsewhere with large impact.

(6) **Funding, Budget and Cost Share:** The likelihood that within five years after award, DoD assistance will not be necessary to sustain the program.

A.2.4. ALTERNATIVE DEPLOYMENT PILOT PROJECTS

This activity is intended to allow proposers to undertake deployment approaches that are alternatives to manufacturing extension service providers. The aims include (1) improving the technological strength of defense dependent small businesses, (2) understanding and improving the interactions between prime contractors or original equipment manufacturers and their supplier chains, including technological and business culture factors, (3) rationalization of quality and other requirements placed by several prime contractors within an industrial sector on their networks of suppliers, (4) adoption of world-class best practices throughout the prime-supplier structure, and (5) small company incubators. Proposals which enable, support, or accelerate the commercialization of new technologies, and proposals which address the need for defense suppliers to change their practices in order to enter commercial markets are encouraged. Projects may focus on the use of new technologies and adoption of international standards for strengthening supplier chains.

An important component of this activity is the thorough documentation of the pilot project, analysis of the results, and publication of a detailed case study. Use of third-party evaluation and analysis would strengthen the proposal. Existing service providers and technology sources should be used as appropriate instead of duplicating resources that are already available.

Special Selection Factors

The following are additional selection factors for this activity that clarify and focus the general planned selection criteria.

(1) **Technology Source:** amplifying factors that will be considered include:

(a) Strength of existing core competency in the proposed area of activity.

(b) Adequacy of plans to identify technology within the proposer's organization and to extract and package it for use by others.

(2) **Delivery Mechanism:** amplifying factors that will be considered include:

(a) Adequacy of plans for identifying in-house or external sources of technology to meet the needs of target population.

(b) Strength of plans to establish linkages with service providers and demonstrated success in forming and maintaining such linkages.

(3) **Management Experience and Plans:** Proposals should identify, treat, and resolve sensitive issues regarding major beneficiaries of the project. There should be a demonstrated valid public purpose in the distribution of benefits. The approach must not create an unfair technological or competitive advantage for one company or group of companies.

(4) **Accessibility of Services and Documentation:** The proposer's plan must include documenting the pilot project, analyzing its results, and publishing the analytical case study to help others replicate, modify, or avoid the approach.

(5) **Coordination and Elimination of Duplication:** The proposal must demonstrate the extent to which the proposed approach makes use of existing technology resources and service providers, and the extent to which the proposer demonstrates an awareness of other pilot projects with the same structure.

(6) **Funding, Budget and Cost Share:** The likelihood that within five years after award, DoD assistance will not be necessary to sustain the program.

Examples of Possible Activities to be Proposed

(1) **Supplier chain.** Proposal from XYZ prime contractor and a group of 50 of its principal suppliers to implement a system of electronic commerce for business and product description activities. They will use international and national standards for communication and data description, and will involve equipment vendors so that once completed, elements of the system can be offered as products. XYZ will provide the matching funds as cash, and both XYZ and the suppliers will purchase necessary equipment outside the project budget. 75% of the expenditures of the project will be made for personnel and activities of the suppliers, product vendors, and third-party technical assistance providers, and no more than 25% will be used for XYZ costs. A combination of commercial consultants and manufacturing extension service providers will be used to implement this project. A team consisting of a highly regarded faculty member and a group of her graduate students will be integral participants in the project to document the project, provide analysis, and publish the case study.

(2) **Regional network of suppliers.** Three prime contractors that are served by a common supplier base in a defined geographical region join with the Department of Commerce of the state in which they are located and a group of 30 suppliers to propose a set of activities which will simplify and rationalize the requirements placed by the prime contractors on their suppliers. The intent is two-fold: to reduce costs and improve the quality of components by eliminating needlessly varying requirements, and to introduce international best management practices into the prime contractors. The prime contractors provide the matching funds as cash, and utilize them as in example (1) above.

(3) **Commercialization.** A non-profit proposer has a means to accelerate the commercialization of technologies within an industrial sector which is concentrated in a geographical region that contains research organizations and manufacturers. The proposal is submitted in partnership with several research organizations and several large manufacturers.

(4) **Electronic Commerce.** A university research center and a non-profit industrial consortium propose to complete the development of systems for electronically linking small firms with their large customers in order to enable rapid, paperless, and accurate ordering and product specification. The proposal includes demonstrations connected with rejuvenation of a major American industry which will require a nationwide network of suppliers.

(5) **High Technology Deployment.** One example of a function encouraged in the alternative mechanisms activity is high technology deployment. High technology deployment refers to the transfer of technologies that may not have wide applicability across industry, may require a large investment in

resources, and may be at a low stage of maturity. However, these technologies have tremendous potential for creating competitive world-class products. Innovative methods for identifying and transferring high technologies are solicited in the alternative deployment mechanisms activity.

(6) **Regional Alliance Consisting of Defense Prime and Sub-tier Contractors.** This example describes a partnering activity where one or more defense prime contractors partner with their suppliers in utilizing product or process capacities for commercial applications; thus maintaining a capability for national security emergencies through a viable manufacturing capability and a viable supplier base. In cases where contractors have facilities which may be utilized for commercial markets, and the prime contractor is not interested in entering such markets, partnerships with suppliers may result in the suppliers using such capability to offset decreasing defense revenues. Such alliances may include training by the prime contractor to expand the supplier competency, arranging for the supplier to utilize equipment, etc. on the prime contractor U.S. supplier site. Funds for supporting such activity would go to the supplier or suppliers to cover the costs of establishing such partnerships and for compensating the prime contractor for the contribution it has made to the arrangement.

(7) **Prime Contractor-Supplier Integration:** Projects of interest will focus on moving defense contractors and their suppliers toward dual-use practices and processes. Each project would involve a prime contractor with more than one regional manufacturing site, the suppliers supporting the regional manufacturing site and the supporting regional infrastructure. Although a principal strategy of the project is the establishment of regional prime-contractor-led dual-use teaching factories for their suppliers, it is also essential to assist the suppliers in implementing the results. The prime contractor-supplier team will represent a critical industrial base sector for defense and will analyze "lean" manufacturing principles for defense and commercial business opportunities for new and expanding markets. The prime contractor will organize a regional dual-use teaching factory using existing specific corporate resources and the available regional technical assistance services. Market analysis, business strategic planning, advanced enterprise concepts, material and processes, equipment, training, best practices, international standards, apprenticeships, electronic commerce, and statistical process control will be typical of the topics for the teaching factory curriculum. The curriculum will be tailored to the needs of the prime contractor's suppliers in their quest to provide defense and commercial sector as well as small commercial suppliers seeking to become cost effective dual-use defense suppliers. Using teaching factory techniques, the defense suppliers will establish a Strategic Business Plan for becoming efficient and effective dual-use suppliers. The prime contractor, working with the regional technical assistance services will financially assist the supplier in achieving the plan's objectives, and will also support the "incubation" of new technology businesses. As the concept is demonstrated, extension of the teaching factory activities to other regions by the prime contractor will involve other suppliers in related sectors. Manufacturing extension service providers, manufacturing technology access services, local/state/federal-supported or non-profit centers will be employed to provide technical and business expansion services.

(8) **Teaching Factory.** A government facility which has substantial equipment and in-house expertise that are not fully utilized, including machining, forming, and other manufacturing processes, joins with a group of service providers to utilize the government facility as a teaching factory/shared manufacturing facility. Firms make use of the facility to train their work force on new equipment and to try out equipment so they can make informed decisions on their own purchases. They purchase time on equipment for prototype and early production runs before they have enough volume to justify buying it themselves. The experts from the government facility support these functions and in addition provide assistance to firms through their partner organizations. Matching funds are proposed from a combination of user charges (1/3), state and local funding (1/3), and non-DOD federal funds from the government facility (1/3).

(9) **New Business/Job Creation.** After a major defense/commercial manufacturer laid off 10,000 employees in a single region, the state, the manufacturer, and the laid-off employees joined to form a non-profit corporation intended to stimulate the creation of new companies to design, manufacture, and market products and components that displace imported products and components. Initial funding and match are provided by the manufacturer and by the state from its unemployment fund. This is treated as a pilot project which might have application in other areas of the country, and it is heavily documented as such.

A.2.5. TECHNOLOGY ACCESS SERVICES

This activity assists businesses and extension service providers to access technologies from government and private sources. Proposals are encouraged that address the need to identify, extract, and transition technology from existing sources for use by small businesses, especially those which are defense dependent. The transitioning may be direct to the small firm, but, for reasons of location and distance, it will generally involve an extension service provider or other intermediary.

There is a remarkable variety and depth of technology available in the U.S., in government, industry, and university laboratories, but the means are not generally available for rapidly moving this technology into use in commercial products or manufacturing processes. In some cases, a "packaging" function might be required, in which components are drawn together from a variety of sources to solve a particular class of problems. In other cases, a proposer might serve as an intermediary, at the gates of a national laboratory or as a center attached to a consortium of universities. Innovative approaches coupled with systematic evaluation of performance are encouraged.

Proposals will focus on the use of established core technical competencies rather than on development of new expertise. The primary emphasis will be on providing extension service providers and defense-dependent small businesses with access to state-of-the-art capabilities either for adoption and implementation or as demonstrations of emerging technological opportunities. National laboratories, NASA Regional Technology Transfer Centers, DoD Centers of Excellence, NIST laboratories, university centers, and other public entities currently involved in such pursuits may form the nucleus for such activities. Private services, including non-profit and corporate laboratories will be considered.

Proposals can be regionally based or industry sector based. In the former case, the proposer should describe the intended service area and balance the scale of the proposal with the number of firms or service providers in the region. In the latter case, the proposer should describe how the services will be made available to distant small manufacturers.

Special Selection Factors

The following are additional selection factors for this activity that clarify and focus the general planned selection criteria.

(1) **Technology Source:** amplifying factors that will be considered include:

(a) Strength of existing core competency in the proposed area of activity.

(b) Adequacy of plans to identify technology within the proposer's organization and to extract and package it for use by others.

(2) **Delivery Mechanism:** amplifying factors that will be considered include:

(a) Adequacy of plans for identifying in-house or external sources of technology to meet the needs of target population.

(b) Strength of plans to establish linkages with service providers and demonstrated success in forming and maintaining such linkages.

(3) **Funding, Budget and Cost Share:** The likelihood that within five years after award, DoD assistance will not be necessary to sustain the program.

Examples of Possible Activities to be Proposed

(1) **Packaging Related to Environmentally Conscious Manufacturing:** A proposal from a non-profit research institution in partnership with Environmental Protection Agency, a trade association for machining, and a state environmental protection agency to (1) identify the highest priority three environmental compliance problems for machine shops, (2) define best-practice technological solutions for these problems, (3) document implementation manuals for these solutions, including assessment methodologies and instruments, substitute materials, processes, and equipment, training for work-force and managers, and monitoring approaches to assure compliance, and (4) a plan to make these solutions available on a broad basis to service providers or small manufacturers. Match is proposed from fees and licensing revenues together with in-kind from the partners, and possible funding from a non-DOD agency. After addressing major problems for this industrial sector, the organization plans to team with the trade association for another sector and address issues there.

(2) **Transition at the Gates of a National Laboratory:** A proposal from a team consisting of a national laboratory, an industry consortium representing an industrial sector, and a university to establish a technology transition organization outside the gates of the laboratory, with the intent to facilitate the transfer of industrial sector specific technology out of the laboratory. Matching funds are provided by the laboratory and consortium, with in-kind match from the university.

(3) **Center of Excellence:** A Navy Center of Excellence teams with a non-profit information utility and a federal laboratory to provide rapid-response answers to materials problems being faced by small manufacturers working with service providers. First, the specialized expertise of the team is to be extensively cataloged and made available for computer search; next, the team begins to catalog expertise available from other sources, ending with an exhaustive map of expertise nationwide on issues related to materials. The team provides direct answers and leads to sources of answers. Match is provided by a combination of funds from the federal laboratory and fees charged to users.

(4) **Technology Consultants:** A not-for-profit research and development firm, corporate research and development center, national laboratory, or university research center has a specific technology expertise. This expertise is made available through the extension service providers. Match is provided at the time of access by a combination of in-kind contributions and fees charged to users.

(5) **Federal Laboratory Software Access Service:** A proposal from one or more defense industry associations, several Federal laboratories, and a professional training firm to catalog, distribute, and train small defense dependent firms and technology extension service providers, software developed in Federal laboratories. The non-DoD matching funds would come from the non-DoD Federal laboratories, software license fees, and training course tuition.

A.3. Manufacturing Education and Training Activity Area

Manufacturing covers a wide range of technologies and concepts, encompassing the breadth of materials, products and processes upon which the American industrial enterprise is based. These range from chemical and biotechnology processing to electronic component and system fabrication, durable goods production, and other sectors.

Activities in manufacturing education and training will provide new engineering opportunities to prepare defense and commercial engineers and technicians to contribute to the global design and manufacturing base of the future. Emphasis will be on dual-use engineering skills and business knowledge. Activities will target improvement of curricula at universities, colleges and community colleges. Activities which place special emphasis on skill conversion for engineers, technicians, and other professionals displaced by the defense drawdown are encouraged.

Attention should be given to the following broad considerations:

The Role of Industry: Industry personnel are expected to be integral members of the proposing teams and to be actively involved in classroom activities and in the mentoring of students. Firms are encouraged to provide on-site production experience for students. *Industry is expected to provide match to the annual level of Federal government support by the end of each year.* This matching can include funds, compensated personnel time, contributed equipment, and facilities.

Diversity of Participants: Preferences will be shown to set of awardees that is diverse with respect to geographic location, affected student population, and firm type.

Post-Award Oversight: Awards will be cooperative agreements or grants, and periodic reviews will be held to check on progress and to assist in smooth and effective program development.

Proposals will be invited that represent team efforts between academe and industry, in partnership with their respective States. All awardees are expected to assume a responsibility for implementation, assessment, and dissemination. Proposals will be sought for the following activities:

- Engineering Education in Manufacturing Across the Curriculum
- Practice-Oriented Master's Degree Programs
- Retraining the Manufacturing Work-force
- Educational Traineeships for Defense Industry Engineers
- Manufacturing Engineering Education Coalitions
- Supplementary Education Awards to Ongoing Centers and Coalitions Devoted to Manufacturing
- Individual/Group Innovations in Engineering Education in Manufacturing.

Match Requirements

Match requirements for each activity in this activity area are included below.

Term of Awards

Information about term of awards for each activity in this activity area is included below.

Reporting Requirements

Recipients of awards for Manufacturing Education and Training will be required to provide annual progress reports.

Planned Site Visits and Interviews

During the proposal review and selection process, finalist proposers may be asked to host a site visit by members of the selection panel or staff, or to travel to Washington or other location for an interview.

A.3.1. MANUFACTURING EDUCATION AND TRAINING SELECTION CRITERIA

The proposals will undergo a merit review by the government, involving academe and industry. The selection criteria will be weighted equally, incorporate statutory selection criteria, and are as follows:

(1) **Commitment to Education**

Commitment to providing high quality, accessible manufacturing education.

(2) **Innovativeness**

Innovative, high quality, useful and effective approaches for improving engineering education in manufacturing.

(3) **Target Populations**

(a) Provisions for involving defense firms and the defense work force.

(b) Provisions for involving a significant number of women, members of underrepresented minority groups, and individuals with disabilities through active recruitment of students from these groups.

(4) **Resources**

(a) Fully-qualified faculty and industry participants, experienced in research and education in manufacturing engineering and technology.

(b) Adequacy of the committed resources to fulfill the proposed effort.

(c) Likelihood that the activity will attract funds from non-Federal sources sufficient to meet cost-sharing requirements and sustain the program.

(5) **Industry Involvement**

Demonstrated involvement and commitment of U.S. industry, including the quality of the industrial matching commitment.

A.3.2. ENGINEERING EDUCATION IN MANUFACTURING ACROSS THE CURRICULUM

The TRP will invite proposals for comprehensive, integrated programs in engineering education in manufacturing that cut across the appropriate engineering disciplines. The proposing institutions should have a demonstrated capacity in manufacturing research and education with a record of active industry/university collaboration. The proposing team will involve industry and academic personnel. It may be led by the Dean of Engineering or may be led by a faculty member, in which case the proposal will be endorsed by the Dean of Engineering. Proposals should involve the breadth of departments in the Engineering School, make the best use of cross-disciplinary centers and may involve engineering technology departments and non-engineering disciplines, such as management, mathematics and statistics, the social sciences, and computer science, as appropriate. Proposals with innovative approaches and the potential to create models for wide-spread adoption across the nation are particularly encouraged.

Engineering education and practice are based on a balance among analysis, design, processing, and integration. Typical engineering curricula excel in the teaching of analysis and analysis-based design but fail to adequately educate students with regard to practical manufacturing-related considerations in design

and production. This education typically has been the responsibility of industry and has taken place during the first years of employment. The aim of this initiative is to integrate this industry-based manufacturing experience into university curricula, with the full cooperation and participation of industry, at both the undergraduate and the graduate levels.

Support can be provided for the development of curricula and related courses, their implementation and assessment, teaching/learning laboratories for hands-on manufacturing experience, and manufacturing simulation software. Some support is available to conduct research that supports curriculum development and instruction and is likely to improve manufacturing engineering and technology in these education programs.

It is anticipated that three-year awards for up to a total of $3 million each will be made. Industry is expected to match the annual level of the award by the end of each year. This matching can include funds, compensated personnel time, the use of facilities, contributed equipment and supplies, etc. No renewals are anticipated at this time.

Examples of Possible Activities to be Proposed

Integrated proposals, which include several complementary activities, are particularly encouraged. The following are provided as examples of the types of activities which could be included under this activity and are in no way intended to limit the scope of proposals.

(1) **Manufacturing-Related Design/Manufacturing Experience.** Curricula could be developed to integrate design and manufacturing within the undergraduate experience. Students could be involved in limited-scale design and production teams. Production of student products could occur in industrial facilities or in upgraded university teaching laboratories, where appropriate.

(2) **Synthesis-Based Problem Solving.** A large component of problem-solving in manufacturing is the identification of relevant problems in other domains of application and the synthesis of analogous solutions in the problem area under study. Broadly-based seminar courses which present current production techniques and future challenges of key manufacturing industry components are one possible way to expose students to a wide range of industry experience. The use of guest speakers from industry and a strong mix of high technology and traditional manufacturing situations are desirable.

(3) **Software Tools for Education and Manufacturing.** Common software usage in education and practice provides a common medium for communication. Universities have a great potential for developing manufacturing simulations and other software as teaching tools. Some may have potential for transfer of manufacturing simulation capability to industry through a common software link, as well. The common software link may allow the real-world problem solutions to feed back into the curriculum, often complete with the industry experts that solved them as guest lecturers. Ideally, these systems should integrate design and manufacturing as a part of the learning experience for a range of engineering disciplines.

(4) **Undergraduate Manufacturing Teaching/Learning Laboratories.** Students can benefit from hands-on experience in manufacturing teaching/learning laboratories where they have the opportunity to use industrial processes and make products. Support may be provided to develop or enhance such laboratories to complement the comprehensive, integrated program across the disciplines.

A.3.3. PRACTICE-ORIENTED MASTER'S DEGREES

In many universities, the master's degree has evolved into a preparatory degree for doctoral studies. There is a need for an intellectually rigorous master's program to prepare graduates for the integrated

process of making things in practice. Provision would be made for experienced engineers from defense firms or national laboratories to return to the university to be among the student body pursuing these degrees. Students should be given experience on site, in industry, as a part of the degree program. The students should be exposed to practice-oriented teaching/learning laboratories which include up-to-date manufacturing equipment.

It is anticipated that three-year awards will be made for a total of up to $300,000 each. Industry is expected to match the annual level of the award by the end of each year. This matching can include funds, compensated personnel time, the use of facilities, contributed equipment and supplies, etc. No renewals are anticipated at this time.

Example of Possible Activity to be Proposed

University ABC requests a three year award of $300,000 to develop a program which allows master's candidates to pursue case study-based master's theses in cooperation with a network of 15 local industrial companies. The theses will be jointly supervised by university faculty and industrial experts and will concentrate on the application of basic engineering science to the solution of actual industrial problems. The industry match includes funds for supplies and equipment, use of specialized industrial facilities for experimentation and prototyping and compensated time of industrial personnel for teaching classes, workshops and seminars. The program is supported by a new curriculum which includes a design/prototype laboratory and an instrumentation laboratory that can be used by students in the program to breadboard solutions before presenting their ideas to industry. Industry has provided equipment to help equip these labs, the fair market value of which contributes to the match.

A.3.4. RETRAINING THE MANUFACTURING WORK FORCE

The continual improvement of the knowledge and skill level of the manufacturing work-force and a reorientation of the defense manufacturing work-force towards civilian production are vital to the nation's economic competitiveness and national security. The strength and competitiveness of American industry increasingly depends upon the technical quality of the work-force on the factory floor and the expertise of design/production engineers in actual production. However, the demands of rapidly accelerating knowledge and technology and the pressure for retraining the defense industry work-force are outpacing the ability of our educational system to retrain this work-force.

The activity will provide funds to focus industry, community colleges, and universities on retraining the manufacturing work-force. They are encouraged to establish centers with a state-wide or regional focus designed to enhance the skills and knowledge base of the manufacturing work-force. Special emphasis should be placed on areas of manufacturing with dual-use potential and the involvement of small, medium, and large firms. Proposers are expected to develop innovative approaches to meeting the stated need. The centers should be established using university/community college/industry collaboration to guide their development and operation. Industry is encouraged to participate by focusing the educational efforts on industry and work-force needs, by providing cross-firm teaching/learning facilities, or through other mechanisms. The teams are expected to make effective use of community college faculty and facilities that are already geared to work-force education. They may wish to make use of long-distance learning technology to broadcast courses to the workplace. The university component of the teams should be based in Engineering Schools and make effective use of any existing capabilities in industry/university collaboration in Engineering Research Centers, Industry/University Cooperative Research Centers, and State Industry/University Cooperative Research Centers. The teams may include Engineering Technology Departments, as appropriate. University and community college faculty may choose to offer manufacturing engineering courses at industrial sites as part of a coordinated university/industry educational effort.

The centers' efforts will be focused on developing and testing teaching/learning methods and materials that are appropriate for adult populations, making teaching/learning-scale production equipment available for instruction and the development of new educational technology for production work-force education.

It is anticipated that three-year awards will be made for a total of up to $1.5 million each. Industry is expected to match the annual level of the award by the end of each year. This matching can include funds, compensated personnel time, the use of facilities, contributed equipment and supplies, etc. No renewals are anticipated at this time.

Example of Possible Activity to be Proposed

University DEF and Community College XYZ have developed a joint proposal that requests a three year award of $1,500,000 to implement a regional center to upgrade the skills of the industrial workforce in the quad-city region, a significant area of concentration of medium to large-sized, defense-oriented industry. The proposal upgrades the existing curriculum and training facilities of the community college and augments it by expanding the direct-broadcast, interactive television instructional system of the university. It involves the offering of degree and short course programs on-site, in industry, at locations provided by individual companies and open to all local companies. The industry match includes funds for supplies and equipment, the fair rental value of industrial facilities used for instruction and compensated time of industrial personnel for teaching classes, workshops and seminars.

A.3.5. Educational Traineeships for Defense Industry Engineers

Defense industries employ a large number of highly skilled engineers who can benefit from a reorientation of their education to dual-use capacity. University-based engineering programs for research and education in manufacturing will be provided funds for traineeships to support defense industry engineers or recently unemployed (within the last two years) defense engineers to pursue educational programs focused on dual-use capacity. These traineeships may support special non-degree programs of study, as a technical upgrade, and/or undergraduate/advanced degrees in manufacturing. Each university would provide a group of students with full or part-time support which is expected to cover tuition and living costs. Some funds could be used to develop special educational approaches/materials more suitable for adult populations with practical experience. Team teaching, mixing academic and industrial personnel, is encouraged.

It is anticipated that three-year awards will be made for a total of up to $600,000 each. Industry is expected to match the annual level of the award in cash and in the compensated time that industrial personnel spend at the university, actively engaged in curriculum development and teaching, by the end of each year. No renewals are anticipated at this time.

Example of Possible Activity to be Proposed

University GHI requests a three year award of $600,000 to offer fellowships to defense industry engineers and/or recently unemployed defense industry engineers to pursue educational programs at the university. The university has developed a special program that includes remedial courses in engineering science and mathematics for students who are returning to pursue academic degrees and waives requirements for academic courses that duplicate demonstrated engineering experience gained on the job. The industry match includes fellowship matching funds and the compensated time of industrial personnel involved in curriculum development and in the team teaching of classes, laboratories and seminars at the university.

A.3.6. MANUFACTURING ENGINEERING EDUCATION COALITIONS

Funds will be made available to create one or more Engineering Education Coalitions focused on undergraduate manufacturing education across the curriculum. The Coalitions may be focused on the long-term, systemic reform of manufacturing engineering education and involve a consortium of schools devoted to undergraduate engineering education and the diversity of the future engineering work-force.

It is anticipated that two-year awards will be made for a total of up to $4 million each. Industry is expected to match the annual level of the award by the end of each year. This matching can include funds, compensated personnel time, the use of facilities, contributed equipment and supplies, etc. Up to two additional two-year renewals are anticipated, depending on demonstrated progress.

Example of Possible Activity to be Proposed

Universities J, K, L, M and N request a two year award of $4,000,000 to cooperate in the development of an innovative, cross-cutting, undergraduate curriculum in manufacturing. The proposed curriculum concentrates on the use of advanced, multimedia technology and supercomputer simulations in instruction and on the development of a new curriculum that emphasizes the synthesis of engineering solutions to problems in manufacturing design and production. The proposal has extensive provisions for the propagation of the resulting educational systems into the university community, nationwide. The curriculum will be developed in close cooperation with industry and makes extensive use of industry facilities and personnel in developing industry-relevant courseware. The industry match includes cash, equipment donations, the fair value of the use of industrial facilities, and the compensated time of industrial personnel involved in curriculum development and in the team teaching of classes, laboratories and seminars.

A.3.7. SUPPLEMENTARY EDUCATION AWARDS TO ONGOING CENTERS AND COALITIONS DEVOTED TO MANUFACTURING

To build on the investment already made by NSF in centers devoted to manufacturing research and education, such as the Engineering Research Centers, the Industry/University Cooperative Research Centers, the State Industry/University Cooperative Research Centers, selected Science and Technology Centers, and the ongoing Engineering Education Coalitions, supplementary funds will be made available to enhance their programs of education in manufacturing for dual-use capacity. Funds may be used for major curriculum reform, innovative instructional materials/software, implementation and assessment, and equipment for undergraduate teaching/learning laboratories.

Engineering Research Centers (ERCs) may wish to consider a special effort to build on their capability in strategic research planning focused on technological advancement. ERCs, in collaboration with business schools, could provide guidance to higher levels of management of defense firms in strategic R&D planning to define new market niches for their firms.

It is anticipated that three-year awards will be made for a total of up to $600,000 each. Industry is expected to match the annual level of the award in cash and in the compensated time that industrial personnel spend at the university, actively engaged in curriculum development and teaching, by the end of each year. No renewals are anticipated at this time.

Example of Possible Activity to be Proposed

The Engineering Research Center for Intelligent Concurrent Total Quality Flexible Manufacturing and the School of Business at Alphabeta University have teamed up to request a three year award of $600,000 to provide assistance with strategic research and development planning to local defense firms.

An emphasis of the proposal is the identification of promising commercial market niches for the dual-use production capability of the firms. The industry match includes funds to support the company-specific studies and the compensated time of industrial personnel to assist in the generalization of the results and the development of courses and instructional materials, including case studies.

A.3.8. INDIVIDUAL/GROUP INNOVATIONS IN MANUFACTURING ENGINEERING EDUCATION

This activity invites other innovations in engineering education in manufacturing from individuals and groups already involved in research and education in manufacturing. Joint activities among university-based engineering, engineering technology, and other faculty, and community college faculty are welcome. Industry/university collaboration is expected. These awards may be supplements to ongoing NSF awards or new awards.

It is anticipated that three-year awards will be made, totaling from $150,000 to $600,000 each. Industry is expected to match the annual level of the award in cash and in the compensated time that industrial personnel spend at the university, actively engaged in curriculum development and teaching, by the end of each year. No renewals are anticipated at this time.

Example Proposal

Faculty in the schools of engineering, arts and sciences and education at University QRS have teamed to develop an innovative software/hardware system for manufacturing education. The system will integrate the design, manufacture, and test experience that is needed in industry as a part of the engineering educational curriculum, and will be developed by faculty in education, psychology and a broad range of engineering disciplines, including computer science and engineering. The system will provide a "virtual" manufacturing experience for students from a wide range of disciplinary backgrounds. A three year award of $500,000 is requested. The industry match includes funds, compensated time of industrial personnel in the development of the system, and the fair value of the use of "virtual reality" gear that is owned by industrial companies.

APPENDIX B
STATUTORY PROGRAM REQUIREMENTS

The following is intended to be a plain language summary of the requirements that must be met by each proposal under the Defense Conversion, Reinvestment, and Transition Assistance Act of 1992 and related legislation. A description of each programs requirements is given. In all cases in which this language conflicts with a statute, the statute controls. The text of these statutes has not been published in the official version of the United States Code. Consult Public Laws P.L. 102-484 and P.L. 102-190, or supplements to official and commercially available versions of the United States Code.

B.1. DEFENSE DUAL-USE CRITICAL TECHNOLOGY PARTNERSHIPS (10 U.S.C. § 2511)

Purpose: The objective of Defense Dual-Use Critical Technology Partnerships is to provide for the establishment of cooperative arrangements, also referred to as partnerships, between the Department of Defense (DoD) and other entities to encourage and provide for research, development, and application of dual-use technologies.

Financial Instruments: The program may be administered through a variety of financial instruments, including grants, contracts, cooperative agreements and other transactions. There is no statutory maximum period of performance for this program.

Program Proposers and Participants: Partnerships funded under this program must include:

- two or more "eligible firms" (as defined in 10 U.S.C. § 2491 (see Appendix F)), or
- a nonprofit research corporation established by two or more eligible firms.

As determined to be appropriate by the Secretary of Defense, a partnership may also include: a Federal laboratory or laboratories, government owned and operated industrial facilities, agencies of State governments, institutions of higher education, and other partnership support entities.

Adjusted Funding: The Federal government will generally provide no more that 50 percent funding, although at the discretion of the Secretary of Defense more than 50 percent funding may be provided. Fiscal Year (FY) 1993 funding for this activity is $81.9 million. The program was funded at $50 million in FY 1991 and $60 million in FY 1992.

Government Furnished Support: DoD may provide technical and other assistance, including access to equipment, facilities and personnel of DoD laboratories to support these activities.

B.2. COMMERCIAL-MILITARY INTEGRATION PARTNERSHIPS (10 U.S.C. § 2512)

Purpose: The objective of Commercial-Military Integration Partnerships is to provide for the development of viable commercial technologies that can also meet future reconstitution requirements and other needs of DoD.

Financial Instruments: This program may be administered through a variety of financial instruments, including grants, contracts, cooperative agreements and other transactions. There is a five year limitation on funding for any project.

Program Proposers and Participants: Partnerships established under this program must include:

- one or more "eligible firms" (as defined in 10 U.S.C. § 2491 (see Appendix F)), or
- one or more nonprofit research corporations established by two or more eligible firms.

As determined to be appropriate by the Secretary of Defense, a partnership may also include: a Federal laboratory or laboratories, agencies of State governments, institutions of higher education, and other partnership support entities.

Adjusted Funding: The Department of Defense shall provide no more that 50 percent of project funding in year 1; no more than 40 percent of funding in year 2; and, no more than 30 percent in years 3 through 5. Fiscal Year 1993 funding for this activity is $42.1 million.

Government Furnished Support: DoD may provide technical and other assistance to support these activities.

B.3. REGIONAL TECHNOLOGY ALLIANCES ASSISTANCE PROGRAM (10 U.S.C. § 2513)

Purpose: The objective of the Regional Technology Alliances Assistance Program is to facilitate the use of one or more defense critical technologies for defense and commercial purposes by an industry in the region served by each alliance in order to maintain domestic industrial capabilities that are vital to the national security of the United States.

Financial Instruments: This program may be administered through a variety of financial instruments, including grants, contracts, cooperative agreements and other transactions. There is a six year limitation on funding for any project.

Program Proposers and Participants: Regional technology alliances must include at least one of the following:

- one or more "eligible firms" (as defined in 10 U.S.C. § 2491 (see Appendix F)) that conduct business in the region of the United States served or to be served by the alliance, and
- a "sponsoring agency" in such region that must be:
  - an agency of a State or local government, or
  - a nonprofit organization established, or performing functions, pursuant to an agreement entered into by two or more States or local governments, or
  - a membership organization in which a State or local government is a member, or
  - an institution of higher education designated by a State or local government.

Regional technology alliances may include other organizations considered appropriate by the Secretary of Defense.

The sponsoring agency of an alliance shall operate under a management plan that includes provisions for the eligible firms participating in the alliance to have primary responsibility for the alliance's activities, and to exercise that responsibility through majority voting membership of such firms on the board of directors of the alliance. The statute does not specify when the management plan shall be submitted.

Adjusted Funding: The Department of Defense shall provide no more than 50 percent of funding for a maximum of six years for each project funded. Sponsoring organizations must provide adequate assurances that they will meet financial requirements and provide assistance in the management of the alliance. The Secretary of Defense may not provide financial assistance under the program for construction or renovation of facilities. If the right to use or license the results of any research and development activity of an alliance is limited by participants in the alliance to one or more, but less than one-half, of the eligible

firms participating in the alliance, the non-Federal Government participants in the alliance shall pay the total cost incurred for such activity. Fiscal Year 1993 funding for this activity is $90.5 million.

Government Furnished Support: DoD may provide technical assistance to support these activities.

B.4. DEFENSE ADVANCED MANUFACTURING TECHNOLOGY PARTNERSHIPS (10 U.S.C. § 2522)

Purpose: The objective of Defense Advanced Manufacturing Technology Partnerships is to encourage and provide for research and development of advanced manufacturing technologies with the potential for having defense and dual-use applications. The statute does not specify what constitute advanced manufacturing technologies. However, to the extent practicable, partnerships will be directed to efforts in manufacturing technologies that would significantly reduce the health, safety, and environmental hazards of existing manufacturing processes.

Financial Instruments: The program may be administered through a variety of financial instruments, including grants, contracts, cooperative agreements and other transactions. There is no statutory maximum period of performance for funded projects in this program.

Program Proposers and Participants: Partnerships funded by this program shall include at least one of the following:

- an entity composed of two or more "eligible firms" (as defined in 10 U.S.C. § 2491 (see Appendix F)), or
- a nonprofit research corporation established by two or more eligible firms.

As determined to be appropriate by the Secretary of Defense, an applicant may also include: a Federal laboratory or laboratories, agencies of State governments, institutions of higher education, other partnership support entities, and other organizations considered appropriate by the Secretary of Defense.

Adjusted Funding: The Federal government will generally provide no more that 50 percent funding, although at the discretion of the Secretary of Defense more than 50 percent funding may be provided. Fiscal Year 1993 funding for this activity is $23.5 million.

Government Furnished Support: DoD may provide technical and other assistance, including equipment, facilities and personnel of DoD laboratories, to support these activities.

B.5. MANUFACTURING EXTENSION PROGRAMS (10 U.S.C. § 2523)

Purpose: The objective of Manufacturing Extension Programs is to establish a program: (a) to support existing manufacturing extension programs of regions, States, local governments, and private, nonprofit organizations; (b) to promote the national security of a broad range of such programs that will benefit both the national security and the economic prosperity of the United States; and (c) to increase the involvement of appropriate segments of the private sector in activities that improve the manufacturing quality, productivity, and performance of United States-based small manufacturing firms.

Financial Instruments: This program may be administered through a variety of financial instruments, including grants, contracts, cooperative agreements and other transactions. There is a five year limitation on funding for any project.

Program Proposers and Participants: Program applicants are limited to manufacturing extension programs of regions, States, local governments, and private, nonprofit organizations. A manufacturing extension program is defined in 10 U.S.C. § 2491(11) as "a public or private nonprofit program for the

improvement of the quality, productivity, and performance of United States-based small manufacturing firms in the United States." This program is also addressed to existing programs of the Department of Commerce that include:

- "any United States-based nonprofit institution or organization, or group thereof" [15 U.S.C. § 278k(a)],
- "any nonprofit institution, or group thereof, or consortia of nonprofit institutions" [15 U.S.C. § 278k(c)(3)],
- "State technology programs" [15 U.S.C. § 278*l*(a)].

Adjusted Funding: The Department of Defense shall provide no more that 50 percent of funding for a maximum of 5 years. Fiscal Year 1993 funding for this activity is $87.4 million. An evaluation of each manufacturing extension program funded shall be conducted during the third year that such program receives financial assistance, and on the basis of that evaluation the program may be terminated for good cause, as further defined in 10 U.S.C. § 2523(B) and (C).

Government Furnished Support: Not available.

B.6. DEFENSE DUAL-USE ASSISTANCE EXTENSION PROGRAM (10 U.S.C. § 2524)

Purpose: The objective of the Defense Dual-Use Assistance Extension Program is to further defense reinvestment, diversification and conversion. This program will assist businesses economically dependent upon DoD expenditures to acquire dual-use capabilities. The following forms of assistance will be provided by the contractors:

(1) Assistance in converting from government-oriented management, production, training, and marketing practices to commercial practices.
(2) Assistance in acquiring and using public and private sector resources, literature, and other information concerning—
  (A) research, development, and production processes and practices;
  (B) identification of technologies and products having the potential for defense and non-defense commercial applications;
  (C) marketing practices and opportunities;
  (D) identification of potential suppliers, partners, and subcontractors;
  (E) identification of opportunities for government support, including support through grants, contracts, partnerships, and consortia;
  (F) enhancement of work force skills and capabilities, including—
    (i) development and introduction of high-performance work systems, work force literacy programs, and programs for worker education and training;
    (ii) other programs that build upon the skills and capabilities of the work force; and
  (G) trade and export assistance.
(3) Loan guarantees to small businesses that are economically dependent on defense expenditures, under the terms and conditions specified under other applicable law.

In addition:

The Secretary of Defense is authorized to carry out a program to provide assistance to small businesses that are economically dependent on defense expenditures to obtain access to a national network of scientists and engineers, and to information resources (including access through on-line data bases to local, national, and international technical and business literature encompassing a wide range of

technologies), that can help minimize technical risk and thereby facilitate the development and commercialization of new products.

Financial Instruments: This program may be administered through grants, contracts, cooperative agreements and other transactions. There is no statutory maximum period of performance for funded projects in this program. However, no new assistance programs can be funded after September 30, 1995, and no funding is authorized beyond September 30, 1998, except for the national network access program.

Program Proposers and Participants: Program applicants shall be potential sponsors of assistance programs to assist businesses economically dependent on Department of Defense expenditures to acquire dual-use capabilities and shall include at least one of the following:

- Federal government agencies,
- regional entities,
- State and local governments,
- private entities, and
- nonprofit organizations.

Adjusted Funding: The Department of Defense shall provide no more that 50 percent of project funding in year 1, no more than 40 percent of funding in year 2, and, no more than 30 percent in years 3 and beyond. Fiscal Year 1993 funding for this activity is $90.8 million.

Government Furnished Support: DoD may provide technical and other assistance (included in the 50% maximum federal contribution) to support assistance programs.

B.7. MANUFACTURING ENGINEERING EDUCATION: GRANT PROGRAM (10 U.S.C. § 2196)

Purpose: The objective of the Manufacturing Engineering Education program is to enhance existing programs in manufacturing engineering or to establish new programs in manufacturing engineering education.

Financial Instruments: This program shall be administered through competitively awarded grants.

Program Proposers and Participants: Proposers to this program shall be either institutions of higher education or consortia of institutions of higher education. "Eligible firms" and other support organizations may also be involved.

Adjusted Funding: The Federal government shall provide no more that 50 percent of the estimated cost of carrying out the activities proposed. At least one-third of the grants shall be awarded for establishing new programs in manufacturing engineering education. In awarding grants, the Secretary of Defense shall, to the maximum extent practicable, avoid geographical concentrations of awards. Fiscal Year 1993 funding for this activity is $23.5 million. This will be added to the Fiscal Year 1992 appropriation of $20.1 million. There is no limitation on the period of funding for any project funded under this program.

Government Furnished Support: Not available.

B.8. MANUFACTURING EXPERTS IN THE CLASSROOM (10 U.S.C. § 2197)

Purpose: The objective of the Manufacturing Experts in the Classroom program is to support activities of one or more manufacturing experts at institutions of higher education. The statute does not define the qualifications of the experts to be involved.

Financial Instruments: This program shall be administered through competitive award based upon merit pursuant to procedures prescribed by the Department of Defense. Financial instruments are not identified by the statute.

Program Proposers and Participants: Proposers to this program shall be United States institutions of higher education. Participants may also include "eligible firms" and other support organizations.

Adjusted Funding: The Department of Defense shall provide no more than 50 percent of funding with a minimum period for performance of 2 years for any project funded. Fiscal Year 1993 funding for this activity is $4.6 million, with a maximum allocation of $250,000 per year to any eligible institution.

Government Furnished Support: Not Applicable.

APPENDIX C
SMALL BUSINESS INNOVATIVE RESEARCH (SBIR)

Those planning to respond to the TRP sponsored SBIR program should acquire a copy of the complete, forthcoming solicitation entitled "Defense Conversion, Reinvestment, and Transition Assistance."

C.1. INTRODUCTION

The Technology Reinvestment Project (TRP) plans to solicit proposals from small businesses with strong research and development capabilities in science or engineering under the solicitation of the main initiative on or about May 14, 1993 (not the standard SBIR program) entitled "Defense Technology Conversion, Reinvestment, and Transition Assistance." Proposals can address any of the Appendix A.1. Technology Development Focus Areas of this Program Information Package. The TRP expects to award only SBIR Phase I contracts under this appropriation and Phase II proposals under future appropriations.

The Federal SBIR Program is mandated by the Small Business Innovation Development Act of 1982, PL 97-219, PL 99-443, and PL 102-564. The basic design of the SBIR Program is in accordance with the Small Business Administration (SBA) SBIR Policy Directive, January 1993. This SBIR initiative will be sponsored by the TRP to exploit the flexibility of the SBA Policy Directive and encourage scientific and technical innovation in Technology Focus Areas most likely to yield results important to the TRP.

C.2. THREE PHASE PROGRAM

A future program solicitation will be issued pursuant to the Small Business Innovation Development Act of 1982. SBIR Phase I awards are intended to determine, insofar as possible, the scientific or technical merit and feasibility of ideas submitted under the SBIR Program and will typically be a one half-person year effort (not to exceed $100K) over a period generally not in excess of six months. Phase I proposals will concentrate on research and development that will significantly contribute to proving the scientific and technical feasibility. The successful completion of Phase I will be a prerequisite for continued TRP support under Phase II. The measure of Phase I success will include evaluations of the extent to which Phase II results have the potential to yield a product or process of continuing importance to dual-use applications.

Phase II proposals may be solicited on the basis of results from Phase I efforts and the scientific and technical merit of the Phase II proposal. Phase II awards will typically cover 2 to 4 person-years of effort over a period generally not to exceed 24 months. Phase II is the principal research or research and development effort and is expected to produce a well defined deliverable product or process. This will require a more comprehensive Phase II proposal.

Future TRP funds outside of the SBIR program will be used to pursue Phase III efforts. It is intended that this TRP-sponsored SBIR initiative will provide both the mechanism and compelling incentive to small business for both the development and deployment of dual-use technologies.

Proposals submitted under prior SBIR solicitations will not be considered. Offerors who were not awarded a contract in response to a particular topic under prior SBIR solicitations may update or modify

and submit the same or modified proposal if it is responsive to any of the Technology Focus Areas identified in Appendix A.1.

The TRP is not responsible for any monies expended by the proposer before award of any contract.

C.3. ELIGIBILITY AND LIMITATION

Each proposer must qualify as a small business for research or research and development purposes as defined in Section C.4.(2), below. A minimum of two-thirds of each Phase I SBIR project must be carried out by the proposing firm. For Phase II, a minimum of one-half of the effort must be performed by the proposing firm. For both Phase I and II, the primary employment of the principal investigator must be with the small business at the time of the award and during the conduct of the proposed effort. Primary employment means that more than one half of the principal investigator's time is spent with the small business. Deviations from these requirements must be approved in writing in advance by the contracting officer.

For both Phase I and Phase II, the research or research and development work must be performed in the United States. United States means the fifty states, the Territories and possessions of the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Marianas Islands, the Trust Territory of the Pacific Islands, and the District of Columbia.

Joint ventures and limited partnerships will be permitted, provided that the entity created qualifies as a small business in accordance with the Small Business Act, 15 USC 631, and the definitions included below.

C.4. DEFINITIONS

The following definitions apply for the purposes of this SBIR information package:

(1) **Research or Research and Development**

Basic Research—A systematic, intensive study directed toward greater knowledge or understanding of the subject studied.

Exploratory Development—Systematic study directed specifically toward applying new knowledge to meet a recognized need.

Advanced Development or Engineering Development—A systematic application of knowledge towards the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

(2) **Small Business**

A small business concern is one that, at the time of award of a Phase I or Phase II contract:

(a) Is independently owned and operated and organized for profit, is not dominant in the field of operation in which it is proposing, and has its principal place of business located in the United States;

(b) Is at least 51% owned, or in the case of a publicly owned business, at least 51% of its voting stock is owned by United States citizens or lawfully admitted permanent resident aliens;

(c) Has, including its affiliates, a number of employees not exceeding 500, and meets the other regulatory requirements found in 13 CFR 121. Business concerns, other than investment companies licensed, or state development companies qualifying under the Small Business Investment Act of 1958, 15 USC 661, et seq., are affiliates of one another when either directly or

indirectly (1) one concern controls or have the power to control the other; or (2) a third party or parties control or has the power to control both. Control can be exercised through common ownership, common management, and contractual relationships. The term "affiliate" is defined in greater detail in 13 CFR 121.3-2(a). The term "number of employees" is defined in 13 CFR 121.3-2(t). Business concerns include, but are not limited to, any individual, partnership, corporation, joint venture, association or cooperative.

C.5. PLANNED PROPOSAL REQUIREMENTS

A proposal under the TRP SBIR Program is to provide sufficient information to demonstrate that the proposed work represents an innovative approach to the investigation of an important scientific or engineering problem under the stated selection criteria. The quality of the scientific or technical content of the proposal will be the principal basis upon which proposals will be evaluated. Proposed research or research and development must be oriented towards technological innovation, and new commercial products or processes which benefit the public.

C.6. METHOD OF SELECTION AND EVALUATION CRITERIA

(1) **Introduction**

Phase I proposals will be evaluated on a competitive basis by TRP scientists or engineers knowledgeable in the topic area. Proposals will be evaluated first on their relevance to the TRP mission. Those found to be relevant will then be evaluated using the criteria listed in paragraph (2), below. Final decisions will be made by the TRP based upon these criteria and consideration of other factors including possible duplication of other work, and program balance. The TRP may elect to fund several or none of the proposed approaches. In the evaluation and handling of proposals, every effort will be made to protect the confidentiality of the proposal and any evaluations.

Phase II proposals will be subject to a technical review process similar to Phase I. Final decisions will be made by the TRP based upon scientific and technical evaluations and other factors, including a commitment for Phase III follow-on funding, the possible duplication with other research or research and development, program balance, budget limitations, and the potential of a successful Phase II effort leading to a product of continuing interest to the TRP.

(2) **Phase I Evaluation Criteria**—Phase I proposals will be selected by the TRP based upon the following factors.

(a) The technical approach and the anticipated agency and other commercial benefits that may be derived from the research.

(b) The adequacy of the proposed effort and its relationship to the fulfillment of requirements of the research topic or subtopics.

(c) The soundness and technical merit of the proposed approach and its incremental progress toward topic or subtopic solution.

(d) The qualifications of the proposed principal/key investigators, supporting staff, and consultants.

Where technical evaluations are essentially equal in merit, cost to the government will be considered in determining the successful offeror.

(3) **Phase II Evaluation Criteria**—Phase II proposals will be reviewed for overall merit based upon the criteria below.

(a) The technical approach and the anticipated commercial and other benefits that may be derived from the research.

(b) The adequacy of the proposed effort and its relationship to the fulfillment of requirements of the research topic or subtopics.

(c) The soundness and technical merit of the proposed approach and its incremental progress toward topic or subtopic solution.

(d) The qualifications of the proposed principal/key investigators, supporting staff, and consultants.

(e) Consideration of a proposal's commercial potential as evidenced by (1) the small business concerns record of commercializing SBIR or other research, (2) the existence of Phase II funding commitments from private sector or non-SBIR funding sources, (3) the existence of Phase III follow-on commitments for the subject of the research, or (4) the presence of other indicators of commercial potential for the idea.

The reasonableness of the proposed cost of the effort to be performed will be examined to determine those proposals that offer the best value to the Government. Where technical evaluations are essentially equal in merit, cost to the Government will be considered in determining the successful offeror.

C.7. COST SHARING

Cost sharing will be permitted for TRP proposals; however, cost sharing is not required nor will it be an evaluation factor in the consideration of any Phase I proposal.

APPENDIX D
EXISTING PROGRAMS RELATED TO THE TECHNOLOGY REINVESTMENT PROJECT

D.1. ADVANCED RESEARCH PROJECTS AGENCY (ARPA)

The Advanced Research Projects Agency (ARPA) is a separately organized agency within the Department of Defense under a Director, appointed by the Secretary of Defense. As the central research and development organization of the Department of Defense with a primary responsibility to maintain U.S. technological superiority over potential adversaries, ARPA shall:

- Pursue imaginative and innovative research and development projects offering significant defense utility.
- Manage and direct the conduct of basic and applied research and development projects that exploit scientific breakthroughs and demonstrate the feasibility of revolutionary approaches for improved cost and performance of advanced technology for future applications.
- Stimulate a greater emphasis on prototyping in defense systems by conducting prototype projects that embody technology that might be incorporated in joint programs, programs in support of deployed U.S. Forces (including the Unified and Specified Commands), or selected Military Department programs, and on request, assist the Military Departments in their own prototyping programs. (Code of Federal Regulations, Title 32, Part 358).

ARPA Organization

ARPA functions around ten technical offices:

1. The **Advanced Systems Technology Office** (ASTO) engages in advanced defense research projects to provide superior U.S. defense systems in the area of space, aeronautics, weapons, C3I, Special Operations/Low Intensity Conflict (SO/LIC), counter drug, and distributed simulation. Office Director: Mr. Ronald Murphy, (703) 696-2307.
2. The **Computing Systems Technology Office** (CSTO) advances the frontier of computing systems technology through such approaches as scalable parallel and distributed heterogeneous computing systems technologies, including computer networking technologies and the associated enabling software technologies. Office Director: Mr. Stephen L. Squires, (703) 696-2226.
3. The **Defense Sciences Office** (DSO) plans, directs, and manages activities and programs in the diverse areas of material sciences, advanced mathematics, electromagnetics, biotechnology, and advanced power sources. Office Director: Dr. H. Lee Buchanan, (703) 696-2237.
4. The **Electronic Systems Technology Office** (ESTO) develops advanced sensor, source, actuator, display, and signal processing technology for critical command and control, intelligence, and weapons applications. U.S. leadership in sensors, actuators, sources, and displays is a critical components of national strength, connecting information technology to people and the real world. Office Director: Dr. Lance Glasser, (703) 696-2213.

5. The **Land Systems Office** (LSO) pursues advanced technology in order to create essential changes in land warfare through the introduction of innovative approaches in survivability, mobility and lethality. Office Director: Dr. James Richardson, (703) 696-2325.

6. The **Maritime Systems Technology Office** (MSTO), plans, directs and manages activities and programs involving the application of technologies to naval warfare areas such as antisubmarine warfare, unmanned undersea vehicle applications, advanced marine vehicle design, command control and communications (C3) and special operations. Office Director: Mr. Charles E. Stuart, (703) 696-2315.

7. The **Microelectronics Technology Office** (MTO) develops and demonstrates electronic and optoelectronic components and associated manufacturing processes for general-purpose computing, special-purpose processing, and sensors and sources. Office Director: Dr. Arati Prabhakar, (703) 696-2236.

8. The **Nuclear Monitoring Research Office** (NMRO) is responsible for research, experimentation, and systems development leading to the specification of systems, including expert systems, for detecting nuclear explosions at all distances, and for distinguishing such explosions from earthquakes or other natural or man-made phenomena. Office Director: Dr. Ralph W. Alewine, (703) 696-2246.

9. The **Software & Intelligent Systems Technology Office** (SSTO) is responsible for software database management, computer aided software engineering, intelligent systems and data processing. Office Director: Dr. Edward W. Thompson, (703) 696-2222.

10. The **Special Projects Office** (SPO) engages in advanced defense research projects which will have significant impact on the defense posture of the country. Office Director: Mr. Tom Swartz, (703) 243-9588.

1991 Precompetitive Technology Consortia

Most of ARPA's activities are naturally dual-use in nature. However in recent years ARPA has sponsored work that is particularly aimed at the development of technologies chosen for their specific commercial importance. In FY 1991, Congress provided $50 million to ARPA for precompetitive technology consortia. ARPA funded eight such consortium efforts as described below.

- The **Ceramic Fiber Consortium**, officially called the Integrated High Performance Turbine Engine Technology (IHPTET) Fiber Development Consortium, is composed of seven engine manufacturers with the partial sponsorship of ARPA, Air Force Wright Laboratory, and NASA Lewis Research Center. The objective of the consortium is the development of advanced ceramic fibers to reinforce ceramic and metal matrix composites used as high temperature components in gas turbine engines.

- The Institute of Advanced Composites Technology (Comprised of DuPont, Hercules, Lanxide, the University of Delaware, and ICI America) formed the **Advanced Composites Technology Consortium** to demonstrate the feasibility of achieving breakthrough rapid manufacturing technologies in intermediate and high temperature composites. This consortium will develop and qualify manufacturing processes that have the potential for major cost reductions in defense and commercial composite structures.

- The **Optical Network Technology Consortium** will develop technology for all-optical communication networks capable of three orders of magnitude improvement in throughput and integrated optoelectronic switching networks to interconnect next generation high-performance

computers. The participants are Bellcore, Northern Telecomm, Colombia University, and Hughes Aircraft.

- The **Optoelectronics Technology Consortium** will develop optical/electrical approaches for backplane optical interconnects using both fibers and polymer waveguides. This technology will have broad application in the High Performance Computing Program. While separate contracts were executed with Honeywell, General Electric, AT&T and IBM, each company was connected through a collaborative agreement.

- The goal of the **Advanced Static Random Access Memory** project is to accelerate availability of higher capacity, faster components for use in DoD weapon systems. New device design and process technology will be utilized to reduce the area required for memory circuits. This enables dramatic improvements over the evolutionary trends in the semiconductor industry. A broad agency announcement for individual or consortium proposals in this area resulted in the selection of Micron for a cost-shared contract.

- The **Linguistic Data Consortium**, comprised of industry, universities and government agencies will develop key databases for effective test of speech processing systems. The consortium, led by the University of Pennsylvania, will distribute these reusable resources enabling the competitive development and application of speech processing products.

- The **Scalable Computing Systems Consortium**, which supports the High Performance Computing Initiative (HPC), will work to accelerate parallel computing, provide rapid access to large-scale parallel systems, and stimulate development of DoD HPC collaborations with industry and academia. Innovative ideas were received to accelerate the development and application of HPC hardware and software. From a broad agency announcement, the strongest teams of offerors were selected to found a national high performance computing consortium and develop collaboratively the concepts, resources, and strategy to realize interconnected HPC partnerships. MIT will serve as the executive agent.

- The **Superconducting Electronics Consortium**, a consortium composed of MIT, Lincoln Laboratory, AT&T and IBM will develop applications for superconducting electronics intended to result in revolutionary improvements in performance, size, weight, and power requirements.

1992 Precompetitive Technology Consortia

In FY 92 Congress provided $60 million to further the precompetitive consortium efforts. The following efforts are now in formation:

- The objective of the **DRAM Capacitor Materials Consortium** is to develop new materials and fabrication processes required to produce 1 Gbit dynamic random access memories (DRAMs). Drams are the highest volume and total value electronic parts for both commercial and defense uses and are use extensively in computing systems. A major stumbling block is that a new capacitor mater material will be needed. This consortium will take advantage of the strong technical expertise in the US to develop the new materials needed to replace the silicon oxy-nitrides currently used.

- The **Data Storage Consortium** will conduct research and development in the areas of magnetic and optical recording with storage density goals of 10 gigabits per square inch. High storage densities, improved data rates, smaller volume, lower power consumption, and greater reliability are required for future high resolution imaging and high performance computing. Specific technical goals are to develop, over a 5 year period, the technologies that will lead to magnetic disk

storage of 10 gigabits per square inch; and optical recording densities and data rates at least 10 time the current technologies and systems.

- The objective of the **Electro-Magnetic Code Consortium** is to develop algorithms for the exact solution of Maxwell's equations for application to the solution of problems of low radar cross section aircraft design as well as problems in fluid dynamics, large scale information correlation and fusion, and weather prediction. A major focus is to implement these algorithms on large scale, massively parallel computers.
- The **Micromagnetic Components Consortium** will work to incorporate ferrite (magnetic) materials onto a semiconductor substrate. Until recently, there appeared to be no feasible approach for incorporating ferrite materials onto a semiconductor; however, recent revolutionary advances in ferrite materials technology enable ferrite and semiconductor components to be combined in miniature, cost-effective configurations. The anticipated advances in the microwave ferrite component state of the art will result in cost/performance improvements in numerous DoD and commercial microwave systems.
- The **Precision Investment Casting Consortium** will develop a modeling and simulation computer program to describe the entire casting process from component design through foundry practice. Development of this program will eliminate the current trial and error approach use to design and produce complex castings, reduce the present 30% scrap rates to 5% or less, and reduce the present four year cycle for bringing complex castings to production by at lease two years. The computer code will provide process simulation capability that can be used to optimize design and establish foundry practice. It will also provide the basis to establish and intelligent processing materials scheme to achieve real time process control.
- The **Ultra-Fast, All-Optical Communication Systems Consortium** will work to eliminate data flow bottlenecks and develop efficient wide area networks and long-haul communications systems capable of 10 billion bit per second data rates. An all optical communications system, with its huge bandwidth, is recognized as the only approach for handling this speed and density. The consortia will address both components and architecture and culminate in a demonstration of an ultra-fast optical network.

Related 1993 Initiatives

In addition to the programs described in this announcement, Title IV Defense Conversion appropriations will also fund initiatives in Advanced Materials Synthesis and Processing and Agile Manufacturing and Enterprise Integration. ARPA also participates in the general Department of Defense SBIR solicitation and funds a variety of other projects with dual-use content and implications for defense conversion.

D.2. National Institute of Standards and Technology (NIST)

NIST conducts science and engineering research in commercially important fields such as advanced materials, information systems, biotechnology, optoelectronics, computer-integrated manufacturing, and sensor technology. NIST's laboratory research is designed to support development of critical emerging technologies and the new measurement methods and standards necessary to make them commercially viable. The ability of U.S.-based industries to exploit these new technologies determines in large part the health of the U.S. economy. Several new NIST programs—including the Advanced Technology Program (ATP) and the Manufacturing Technology Centers (MTC) Program (described in the following sections of this document)—help spur innovation at U.S. businesses through seed money for

development of generic technologies; grants to states for support of technology transfer programs; and financial and technical assistance to help small and mid-sized companies adopt more efficient manufacturing methods.

Major facilities located at the Institute's Gaithersburg, MD, or Boulder, CO, sites include a 20-megawatt research reactor, a synchrotron radiation source, an automated manufacturing research facility, a metals processing laboratory, an advanced calibration facility for microwave antennas, and computer network and security research laboratories. The Institute shares its substantial laboratory and testing facilities with researchers from industry, universities, and other federal laboratories engaged in both cooperative and proprietary work.

NIST laboratories are engaged in research in a broad spectrum of science and technology areas. Some NIST research interests are summarized below and telephone numbers are given for each of the NIST laboratories. Information on the NIST Technology Services activities is also provided.

Electronics

Key NIST research supports improvements in quality control and cost-effectiveness in the manufacture of both current and next-generation semiconductors; increasing the efficiency of optical fiber networks; and provides computer facilities and technical assistance for developing standards for advanced digital imaging systems.

Contact: Electronics and Electrical Engineering Laboratory (301) 975-2220

Manufacturing Engineering

NIST researchers are developing advanced control and sensing techniques for automated manufacturing systems and "intelligent" machines. They also work with industry to establish standards for connecting computerized design and manufacturing systems produced by different manufacturers.

Contact: Manufacturing Engineering Laboratory (301) 975-3400

Materials

NIST researchers help develop new technologies to transform advanced materials from laboratory curiosities to viable, high-quality products at reasonable cost. Examples include "intelligent" materials processing, advanced ceramics, high-performance composites, and superconducting materials.

Contact: Materials Science and Engineering Laboratory (301) 975-5658

Physics

NIST studies examine the effect of atomic and magnetic microstructures on macroscopic material properties and develop techniques for inducing, measuring, and controlling chemical reactions on surfaces.

Contact: Physics Laboratory (301) 975-4200

Chemical Science and Technology

NIST is developing computerized "expert" systems for automated control of chemical process and analysis procedures and reliable measurement techniques for the economic production of biochemical products. Basic research studies include the ultraprecise chemical and physical characterization of new materials and study of atomic and molecular properties occurring at the boundaries between solids, liquids, and gases.

Contact: Chemical Science and Engineering Laboratory (301) 975-3145

Building and Fire Research

Specific research projects examine the performance of construction materials, components, systems, and practices, as well as the ignition, propagation, and suppression of fires. New technologies produced by NIST are used to predict, measure, and test performance of construction and fire prevention and control products and practices.

Contact: Building and Fire Research Laboratory (301) 975-5900

Computer Systems

NIST researchers devise methods to help protect computer systems and information against "viruses" and other security threats and support development of standards for integrated telecommunication networks capable of simultaneous transmission of voice, text, images, and data.

Contact: Computer Systems Laboratory (301) 975-2822

Applied Mathematics

NIST researchers produce efficient, robust algorithms used in simulating physical systems, visualizing scientific data, and programming parallel computers. They also develop statistical methods for industrial modernization in process control and improvement of quality and productivity.

Contact: Computing and Applied Mathematics Laboratory (301) 975-2728

Technology Services

Technology Services facilitates the commercialization of NIST research results and technologies by helping to arrange Cooperative Research and Development Agreements with U.S. companies and coordinating patenting and licensing agreements. The group also distributes standard reference materials and data and coordinates equipment calibrations for improving industrial, environmental, and medical quality control.

Contact: Technology Services (301) 975-4500

D.2.1. Advanced Technology Program (ATP)

The Advanced Technology Program (ATP) at the National Institute of Standards and Technology (NIST) is a new program to promote U.S. economic growth and enhance the competitiveness of U.S. high-technology businesses by accelerating the development and commercialization of precompetitive generic technologies and refining manufacturing practices.

Features

The ATP has features which make it unique among all federal programs which support scientific research and technology development. These include:

- Broad scope
- Focus on precompetitive generic technologies
- Direct funding of industry only
- Priorities set by industry
- Funding limits and cost sharing
- Automatic sunset provision
- Selection based on technical and business merit
- Promotion of cooperative research and strategic alliances
- Substantial support to small businesses

- Intellectual property owned by recipients

The ATP has established a "hotline" telephone number than you can call to receive a recorded message regarding the current status of the program. The number is: 301-975-2273. General inquiries may be directed to 301-975-2636 (Facsimile 3011-926-9524 or 301869-1150).

D.2.2. Manufacturing Extension Partnership (MEP)

Manufacturing Technology Centers Program

The Manufacturing Technology Centers program was created by the 1988 Omnibus Trade and Competitiveness Act to improve the competitiveness of U.S. based small and medium sized manufacturers through advances in their levels of technology utilization. Since 1988, seven Manufacturing Technology Centers (MTCs) have been established—in Cleveland, Ohio; Albany, New York; Columbia, South Carolina; Ann Arbor, Michigan; Kansas City, Kansas; Minneapolis, Minnesota; and Los Angeles, California. Over 6,000 firms have participated in MTC activities. Hundreds of small and medium sized companies have benefited from in-depth assessments of their manufacturing and business operations, and thousands have participated in workshops and seminars. Many collaborations have resulted in the licensing of federal technologies, the designing of new processes, and the introduction of new products into the market.

State Technology Extension Program

The State Technology Extension Program (STEP) provides technical assistance and funding to states for planning and implementation of state-based industrial extension infrastructure. Since 1989, 34 states have participated in the program.

Nationwide Network of Extension Centers

In Vision of Change for America, accompanying his State of the Union message, President Clinton described his intention to establish at NIST a program with "over 100 manufacturing extension centers nationwide by 1997 to assist manufacturers to modernize their production capability." This program, which has been planned by the Department of Commerce under the name Manufacturing Extension Partnership (MEP), builds on the foundation of tested approaches developed by the MTC and STEP programs. The plan also includes Manufacturing Outreach Centers, which are smaller in scale than MTCs, will be more numerous, and are intended to serve regions with lower concentrations of manufacturers.

Prior to announcement of a solicitation, NIST staff want to work with potential proposers for deployment activities to help clarify the information in this document, help form necessary linkages, and discuss approaches to deployment. Please call at (301) 975-3944 (MEP Office).

D.3. DEPARTMENT OF ENERGY (DOE)

The U.S. Department of Energy (DOE) is responsible for long-term, high-risk research and development of energy technologies, energy conservation technologies, and nuclear weapons. DOE laboratories and facilities, including weapons production plants, are home to more than 59,000 scientists, engineers, and technicians who perform about $6.6 billion worth of research and development each year. These institutions have a long history of excellence in a number of areas, including the basic sciences, applied energy research, and weapons-related technologies including manufacturing materials and super computer applications. Research at the laboratories and facilities has resulted in important scientific discoveries and the development of more efficient energy sources, advanced computer design and applications, enhancements to manufacturing methods and processes, new materials, and related

technologies, while education, training, and out-reach programs have served to increase the science and engineering capabilities of the nation as a whole.

DOE Technology Transfer

The National Competitiveness Technology Transfer Act of 1989 and other legislation make technology transfer one of the primary missions of DOE to enhance U.S. competitiveness, create new jobs, and improve the quality of life. To this end, directed research and development, technology transfer, and commercialization of technological innovations are done through coordination among: DOE program offices, laboratories, and facilities; institutions of higher learning; and US industry. Various mechanisms are available for working with DOE. Legislation has given federal agencies, including DOE, the authority to enter directly into cooperative research and development agreements (CRADAs) and other types of cooperative agreements with the U.S. private sector to increase technical competitiveness. Other mechanisms for sharing technology include:

- Personnel exchanges
- Data exchange agreements
- Use of specialized facilities
- Cost-shared procurement
- Patent and software licensing
- Reimbursable work for others
- Technical assistance

DOE Technology Offices

The majority of DOE development efforts are managed by seven Research Program Offices.

(1) The **Office of Energy Research (ER)** manages fundamental science and basic energy research programs for DOE in several areas: basic energy sciences, high-energy and nuclear physics, fusion energy, and health and environmental research. Its laboratory technology transfer program is designated to assist in transferring research and technology from the DOE laboratories to the private sector. Technology transfer information may be obtained by calling: (202) 586-3560.

(2) The **DOE Office of Conservation and Renewable Energy (CE)** oversees programs designed to increase energy efficiency and to diversify energy sources, in part by broadening the use of renewable energy technologies. Program activities help industry commercialize promising energy technologies that are environmentally sound, efficient, and competitive. Technology transfer information may be obtained by calling: (202) 586-9346.

(3) The **Office of the Assistant Secretary for Defense Programs (DP)** is responsible for the research, development, production, and testing of nuclear weapons. It is also responsible for nuclear materials production, weapons safety and surety, weapons dismantlement, and other activities related to national security, such as work for others and technology transfer. The Nuclear Weapons Complex (NWC), which includes the DP laboratories, production facilities, and test sites, is charged with carrying out this mission, and possess a broad range of capabilities in advanced technologies which are now available to the private sector through the DP Technology Transfer Initiative (TTI). Under TTI to date, over 200 cost-shared, dual-use collaborative projects have been approved. Technology transfer information may be obtained by calling: (202) 586-7590.

(4) The **Office of Environmental Restoration and Waste Management (EM)** is addressing the cleanup of DOE sites contaminated with radioactive and chemical hazardous waste from weapons-related manufacturing through cost-shared collaborations with industry to demonstrate and evaluate innovative technologies. Major accomplishments In the EM technology development effort include establishing a

technology integration program for small businesses; initiating the Ames Technology Derisking Project; developing alternatives to chlorofluorocarbons in the electronics industry; using airborne characterization technologies to improve worker safety, reduce costs and reduce time spent in site assessment and characterization; and using horizontal wells to remove volatile organic compounds. Technology transfer information may be obtained by calling: (301) 903-7928.

LABORATORIES:		
AMES	Ames Laboratory	(515) 294-2635
ANL	Argonne National Laboratory	(708) 252-5361
BNL	Brookhaven National Laboratory	(516) 282-7338
CEBAF	Continuous Electron Beam Accelerator Facility	(804) 249-7450
FERMI	Fermi National Accelerator Laboratory	(708) 840-3333
INEL	Idaho National Engineering Laboratory	(208) 526-1010
LANL	Los Alamos National Laboratory	(505) 665-9090
LBL	Lawrence Berkeley Laboratory	(510) 486-7020
LLNL	Lawrence Livermore National Laboratory	(510) 422-6416
METC	Morgantown Energy Technology Center	(304) 291-4173
NREL	National Renewable Energy Laboratory	(303) 231-1198
ORISE	Oak Ridge Institute for Science and Education	(615) 576-3756
ORNL	Oak Ridge National Laboratory	(615) 576-6349
PETC	Pittsburgh Energy Technology Center	(412) 892-6029
PNL	Pacific Northwest Laboratory	(509) 375-2789
PPPL	Princeton Plasma Physics Laboratory	(609) 243-3009
SANDIA	Sandia National Laboratories	(505) 845-9407
SLAC	Stanford Linear Accelerator Center	(415) 926-2213
SRTC	Savannah River Technology Center	(803) 725-3020
SSCL	Superconducting Super Collider Laboratory	(214) 708-1069
WHC	Westinghouse Hanford Company	(509) 376-8656
PLANTS:		
Kansas City	(Flexible Mfgr. Sys./Electronics Mfgr./Hybrid Microcircuits)	(816) 997-2847
Pinellas	(Alumina Ceramics/Hermetic Seals/Spec. Electronics Compnts.)	(813) 541-8196
Mound	(Ceramics/Explosives/Detonators/Metallurgy/Auto. Prod.)	(513) 865-3829
Savannah River	(Waste Mgt./Robotics/Nuc. Matl. Production)	(803) 725-2472
Y-12, Oak Ridge	(Mfg. Technology Deployment Ctr./Fabrication/Mfg.)	(615) 576-9662
Pantex	(Devel. & Fabrication of Chemical Explosives/Robotics)	(806) 477-3123

Telephone Numbers for Technology Transfer Contacts

(5) The **Office of Fossil Energy (FE)** carries out programs that will enable the United States to continue using its abundant fossil fuel resources in an economically and environmentally sound manner. To achieve this objective, FE supports more than 500 individual research and development projects under the leadership of scientists and engineers in industrial, academic, and national laboratories. These projects span the full spectrum of fossil energy development, from clean, high-efficiency coal-based power plants and low-cost coal-derived fuels, to improved techniques for discovering and producing oil and natural gas, and to advanced gas turbines and fuel cells. Technology transfer information may be obtained by calling: (202) 586-6503.

(6) The **Office of Nuclear Energy (NE)** administers DOE's nuclear fission energy program. It is responsible for administering advanced technology programs on nuclear fission power generation and

fuel technology; evaluating alternative reactor fuel-cycle concepts; developing space-related nuclear generator systems, Naval nuclear propulsion plants, and reactor cores; developing advanced isotope separation processes; and, to enhance America's competitive position, administering programs designed to transfer DOE-developed technologies to domestic industries. (301) 903-4610.

(7) The **Office of Civilian Radioactive Waste Management (OCRWM)** is responsible for managing and disposing of the nation's spent fuel from nuclear power reactors and high-level waste from power reactors and the defense program. Technology transfer information may be obtained by calling: (202) 586-9173.

DOE Field Facilities

DOE's has unique capabilities in a broad range of new technologies, including super computer applications, microelectronics, lithography, flat panel displays, advanced materials, energy, environment, advanced manufacturing, transportation, biomedical and CAD/CAM/CIM. Access may be arranged through the Office of Research and Technical Applications (ORTA) or comparable office located at the individual sites listed above. A more complete listing and description of DOE programs, offices, labs, plants, and on-going cooperative activities are included in: *Technology Transfer* 92793 (DOE/ST-0005P DE93O03623). Copies are available to the public from the National Technical Information Service, US Depa•tment of Commerce, Springfield, VA 22161, (703) 487-4650.

D.4. DoD Laboratories

DoD Laboratories spend approximately $6.5 billion annually for technology development and employ nearly 60,000 people, including 26,000 scientists and engineers. It is estimated based upon FY 92 data that approximately 20% of this funding supports in-house work with the balance going to universities, Federally Funded Research & Development Centers (FFRDCs), and industry. All current DoD research, development, test and evaluation (RDT&E) activities that have at least 25 percent of their in-house budget in RDT&E funds are listed alphabetically within their military department. For further information regarding DoD laboratories, request a copy of the "Department of Defense In-House RDT&E Activities Management Analysis Report for Fiscal Year 1991" by writing to one of the following addresses:

Office of the Secretary of Defense
Deputy Director of Defense
Research and Engineering
The Pentagon, Room 3E118
Washington, DC 20301-3080

I-NET, Inc.
ATTN: C.S. Group - Project 8920
6430 Rockledge Drive, Suite 600
Bethesda, MD 20817
(301) 564-6712

DoD Laboratories are as follows, listed by Service:

Air Force Laboratories

Armstrong Laboratory, San Antonio, TX 78235-5000	(512) 536-3116
Arnold Engineering Development Center (AFMC), Arnold AFB, TN 37389-1314	(615) 454-4232
Civil Engineering Laboratory, Tyndall AFB, FL 32403-1000	(904) 283-6293
Development Test Center, Eglin AFB, FL 32542-5000	(904) 882-5422
Flight Test Center, Edwards AFB, CA 93524-5000	(805) 277-2140
Frank J. Seiler Research Laboratory, USAF Academy, CO 80840-6272	(719) 472-3120
Phillips Laboratory, Kirtland AFB, NM 87117-6008	(505) 846-0860
Rome Laboratory, Griffiss AFB, NY 13441-4514	(315) 330-7701
Wright Laboratory, Wright Patterson AFB, OH 45433-6523	(513) 255-4119
4950th Test Wing, Wright Patterson AFB, OH 45433-5000	(513) 257-6593
6585th Test Group, Holloman AFB, NM 88330-5000	(505) 479-1368

Army Laboratories

Aeromedical Research Laboratory, Fort Rucker, AL 36362-5292	(205) 255-6900
Armament Research, Development & Engineering Center Picatinny Arsenal, NJ 07806-5000	(201) 724-7012
Atmospheric Sciences Laboratory,White Sands Msl Rng, NM 88002-5501	(505) 678-5232
Aviation Systems Command, St. Louis, MO 63120-1798	(314) 263-1388
Aviation Technical Test Center, Fort Rucker, AL 36362-5276	(205) 255-8000
Avionics Research & Development Activity, Fort Monmouth, NJ 07703	(908) 544-4851
Ballistic Research Laboratory, Aberdeen Proving Grd, MD 21005-5066	(410) 278-6244
Belvoir Research, Development & Engineering Center, Fort Belvoir, VA 22060-5606	(703) 704-2238
Biomedical Research & Development Laboratory, Frederick, MD 21702-5012	(301) 619-7685
CECOM Center for Command, Control and Communications Systems Ft. Monmouth, NJ 07703-5203	(908) 544-4449
CECOM Center for Signals Warfare, Warrenton, VA 22186-5100	(703) 349-7200
Center for Electronic Warfare/RSTA, Fort Monmouth, NJ 07703-5206	(908) 544-3212
Center for Night Vision & Electro-optics, Ft. Belvoir, VA 22060-5677	(703) 704-1133
Chemical Research, Development & Engineering Center Aberdeen Proving Grd, MD 21010-5423	(410) 671-5253
Cold Regions Research & Engineering Laboratory, Hanover, NH 03755-1290	(603) 646-4100
Cold Regions Test Center, Fort Greely, AK 98733	(907) 873-4215
Combat Systems Test Activity, Aberdeen Proving Grd, MD 21005-5059	(410) 278-3402
Construction Engineering Research Laboratories, Champaign, IL 61826-9005	(217) 373-7201
Dugway Proving Ground, Dugway, UT 84022-5000	(801) 831-3314
Electronic Proving Ground, Fort Huachuca, AZ 85613-7110	(602) 538-6389
Electronics Technology & Devices Laboratory, Fort Monmouth, NJ 07703-5000	(908) 544-2541
Engineer Waterways Experiment Station, Vicksburg, MS 39180-6199	(601) 634-3111
Harry Diamond Laboratories, Adelphi, MD 20783-1197	(301) 394-1022
Human Engineering Laboratory, Aberdeen Proving Grd, MD 21005-5001	(410) 278-5800
Institute of Chemical Defense, Aberdeen Proving Grd, MD 21010-5425	(410) 671-3276
Institute of Dental Research, Washington, DC 20307-5300	(202) 576-3484
Institute of Surgical Research, Ft. Sam Houston, TX 78234-5012	(512) 221-2720
Letterman Army Institute of Research, San Francisco, CA 94129	(415) 561-3600
Materials Technology Laboratory, Watertown, MA 02172-0001	(617) 923-5275
Materiel Systems Analysis Activity, Aberdeen Proving Grd, MD 21005-5071	(410) 278-6614
Medical Materiel Development Activity, Frederick, MD 21702-5012	(301) 619-7643
Medical Research & Development Command, Frederick, MD 21702-5012	(301) 619-7613
Medical Research Institute of Infectious Disease, Frederick, MD 21702	(301) 619-2833
Missile Research, Development & Engineering Center Redstone Arsenal, AL 35898-5241	(204) 876-3322
Natick Research, Development & Engineering Center, Natick, MA 01760-5000	(508) 651-4001
OPTEC Test & Experimentation Command, Fort Hood, TX 76544-5065	(817) 288-9114
Research Institute for the Behavioral & Social Sciences, Alexandria, VA 22333-5600	(703) 274-8840
Research Institute of Environmental Medicine, Natick, MA 01760-5007	(508) 651-4811
Tank Automotive Research, Development & Engineering Center Warren, MI 48397-5000	(313) 574-6144
Topographic Engineering Center, Fort Belvoir, VA 22060-5546	(703) 355-2640
Vulnerability Assessment Laboratory, White Sands Msl Rng, NM 88002-5513	(504) 678-2256
Walter Reed Army Institute of Research, Washington, DC 20307-5100	(202) 576-3551

White Sands Missile Range, White Sands Msl Rng, NM 88002	(505) 678-1980
Yuma Proving Ground, Yuma, AZ 85365-9102	(602) 328-2906
Defense Nuclear Agency Laboratories	
Armed Forces Radiobiology Research Institute, Bethesda, MD 20889-5603	(301) 295-1210
Navy Laboratories	
Aerospace Medical Research Laboratory, Pensacola, FL 32508-5700	(904) 452-8078
Air Development Center, Warminster, PA 18974-0591	(215) 441-3067
Air Propulsion Center, Trenton, NJ 08628-0176	(609) 538-6602
Air Test Center, Patuxent River, MD 20670-5304	(301) 863-1650
Biodynamics Laboratory, New Orleans, LA 70189-0407	(504) 257-3917
Civil Engineering Laboratory, Port Hueneme, CA 93043-4328	(805) 982-4980
Clothing and Textile Research Facility, Natick, MA 01760-0001	(508) 651-4172
Coastal Systems Center, Panama City, FL 32407-7001	(904) 234-4011
David Taylor Research Center, Bethesda, MD 20084-5000	(301) 227-1515
Dental Research Institute, Great Lakes, IL 60088-5259	(708) 688-5674
Explosive Ordnance Disposal Technology Center, Indian Head, MD 20640-5070	(301) 743-6803
Health Research Center, San Diego, CA 92186-5122	(619) 553-8400
Medical Research Institute, Bethesda, MD 20889-5607	(301) 295-0021
Medical Research Unit #2, Jakarta, Indonesia,	62-420-7854
Medical Research Unit #3, Cairo, Egypt,	(202) 284-1381
Naval Research Laboratory, Washington, DC 20375-5000	(202) 767-3404
Ocean Systems Center, San Diego, CA 92152-5000	(619) 553-3000
Oceanographic & Atmospheric Research Laboratory	(601) 688-4011
Stennis Space Center, MS 39529-5004	
Ordnance Missile Test Station, White Sands Msl Rng, NM 88002-5510	(505) 678-2101
Pacific Missile Test Center, Point Mugu, CA 93042-5001	(805) 989-7113
Personnel Research and Development Center, San Diego, CA 92152-6800	(619) 553-7812
Submarine Medical Research Laboratory, Groton, CT 06349-5900	(203) 449-3263
Surface Warfare Center, Dahlgren, VA 22448-5000	(703) 663-8531
Underwater Systems Center, Newport, RI 02841-5047	(401) 841-3344
Weapons Center, China Lake, CA 93555-6000	(619) 939-9011
Weapons Evaluation Facility, Albuquerque, NM 87117-5000	(505) 846-7798

D.5. The Federal Laboratory Consortium for Technology Transfer (FLC)

The Federal Laboratory Consortium for Technology Transfer was organized in 1974, and chartered by the Federal Technology Transfer Act of 1986. Its membership consists of approximately 600 Federal research and development laboratories and centers and their parent agencies. The FLC promotes and facilitates the transfer of R&D results from federal laboratories into applications in the private and public sectors, as well as cooperative technology development by industry, member laboratories and universities. The Consortium operates a laboratory locator network that matches technical need with federal laboratory expertise, facilities and technologies.

An important component of the FLC network is the laboratory or center representative to the Consortium. These individuals, in addition to representing their own laboratory, maintain contact with other governmental and private agencies, and research institutions, and form a national network of people dedicated to the process of transferring technology out of the federal laboratories. The strength of the

network is the ability to put a potential contractor in contact with a federal laboratory person with expertise in a specific area of interest. Once the contact is found, arrangements for transfer are between the customer and the laboratory.

As a direct result of FLC involvement, member laboratories have increased positive results in such areas as: cooperative agreements with industry, universities, and State and local governments; expanded dual use of product and process technology; improved access to government experts and facilities for domestic users; and reduced time and resources required to put Federal technologies to use.

For additional information contact:

FLC Administrator
George Linsteadt
P.O. Box 545
Sequim, WA 98382-0545
(206) 683-1005

FLC Laboratory Locator
Andrew Cowan
P.O. Box 545
Sequim, WA 98382-0545
(206) 683-1005

D.6. National Technology Transfer Network

Additional assistance in identifying and forming potential dual-use partnerships with Federal laboratories and agencies can be obtained by contacting the NASA-sponsored National and Regional Technology Transfer Centers. The purpose of the National Technology Transfer Network is to provide an effective, market oriented means of linking technologies from the Federal R&D base to the technology needs of industry. The network facilitates rapid access by U.S. firms to the Federal R&D base and the full range of Federal technology transfer capabilities and services. Overall, the network provides a national framework for the public and private sectors to work together productively to enhance the economic competitiveness of the United States.

Within the network, the National Technology Transfer Center (NTTC), serves as a national clearinghouse for Federal technology and provides services and assistance in the areas of training and outreach. To contact the NTTC, call 1-800-678-NTTC.

The Regional Technology Transfer Centers (RTTC's) are aligned with the six Federal Laboratory Consortium (FLC) regions in the Northeast, Mid-Atlantic, Southeast, Midwest, Mid-Continent and the Far West. The RTTC's, in close cooperation with the FLC, individual Federal labs and State programs, provide technology matching services to U.S. industry. The RTTC's assist industrial clients in accessing and acquiring Federal technology and developing technology commercialization partnerships with NASA and other Federal laboratories. A single 1-800 number will connect you with the RTTC in your region. Call 1-800-472-6785.

D.7. National Science Foundation (NSF)

The National Science Foundation (NSF) is a federal agency that provides financial and other support for research, education, and related activities in science, mathematics, and engineering. The goals of research supported by NSF include expanded knowledge; excellence in education; economic competitiveness, innovation, and productivity; and improved quality of life. Of all federal agencies, NSF alone has the broad mission of promoting science and engineering in general and supporting basic research across all fields and disciplines.

NSF awards grants to academic institutions, private research firms, and non-profit institutions. Through its support of centers, groups and laboratories as well as individual awards, NSF has established an infrastructure of researchers from academe, in collaboration with industry, which focuses on research relevant to technologies with dual-use potential. For example, NSF has established industry/university

collaborative partnerships relevant to most of the technology focus areas. In addition, NSF supports centers which move research along the R&D continuum toward development through experimental testbeds. NSF has also developed several innovative approaches to extension assistance through its university/industry collaboration in centers focused on technology transfer and local economic development. Finally, NSF plays the lead role in infrastructure and education through support of curriculum and educational delivery systems advances.

The Engineering Research Centers (ERC) Program, begun in 1985, is designed to support cross-disciplinary teams in research and education important for competitiveness by focusing their efforts on engineering systems. The program requires active collaboration with industry in planning, research, and education with a view to the transfer of knowledge and technology advances for use in industry. There are currently 18 ERCs. NSF has experience in working jointly with DARPA and other military agencies to focus research on dual-use critical technologies. For example, the Purdue ERC on Intelligent Manufacturing Systems is working with the Army to develop its quick turn-around manufacturing cell for military production uses.

The Industry/University Cooperative Research Centers (I/UCRC) Program, provides "seed" support for some 50 centers to work in close collaboration with industry on research relevant to industrial needs, such as: data storage systems, rapid prototyping, optoelectronics, polymer-matrix composites, microwave and millimeter wave technologies, material handling technologies, communications and signal processing, and interactive computer graphics.

The Science and Technology Centers (STC) Program, begun in 1987, is designed to couple university-based scientists and engineers for focus on research with a long-term technological horizon and to promote linkages with industry and other sectors. There are currently 25 STCs. The visualization STC focused on virtual reality is a partnership with DARPA and the major private sector computer firms.

NSF supports a wide range of advanced manufacturing technology research and development with potential for dual use applications. A successful example is the **Strategic Manufacturing Initiative (STRATMAN)**, in which NSF and DoD joined in supporting 16 small research groups covering such topics as: integration of manufacturing processes and systems; rapid prototyping; and next generation machine tools and manufacturing equipment to achieve superior performance.

NSF has experience with **regional technology alliances**. For example, through NSF's support of 10 State/Industry/University Cooperative Research Centers, research is moved beyond its fundamental phase to explore development through proprietary research supported by the States and industry. Many focus on issues which have dual-use potential. For example, the University of Maryland State I/UCRC on electronic packaging involves substantial DoD support and the involvement of a wide array of defense firms.

The **Materials Research Laboratories** started as Interdisciplinary Laboratories under the Advanced Research Projects Agency in the Department of Defense in 1960. In 1972, the responsibility for the laboratories was transferred to NSF and they were renamed Materials Research Laboratories (MRLs). Because of their broad scope and focus on interdisciplinary programs in materials research, the current set of 10 MRLs has proven attractive to industry. Industrial involvement across the MRLs varies according to the relevance of the work to industrial interests.

Begun in 1984, the four **Supercomputer Centers** serve the U.S. academic research community by providing access to traditional vector supercomputers and new, high performance parallel computers to individual investigators in many disciplines. The Centers have very close links with industry to facilitate the use of supercomputers by industry. These centers stress industrial collaboration in their missions and provide supercomputing resources, training, and user services to industry. Industrial firms are

collaborators in the research and training programs of the centers. NSF's HPCC Program activities build on activities at the Centers and in related research. Included are joint efforts between NSF and other participating agencies. For example, efforts with the Department of Defense (ARPA) have resulted in the placement of scalable parallel systems at the National Supercomputer Centers and the California Institute of Technology.

NSF leads the federal implementation of the **National Research and Education Network (NREN)** through the coordinating activities of the HPCC program and the Federal Networking Council. NSF, working closely with other federal agencies to interconnect their cross-country research networks, has upgraded and extended the NSFNET backbone to accommodate substantial growth in usage and new applications not feasible at lower speeds.

The **National Center for Atmospheric Research (NCAR)** was established in 1960 and has developed an active program of research in atmospheric phenomena relevant to aviation technology that receives considerable industrial support. NCAR's mission includes technology transfer to government agencies and industry.

NSF supports a broad array of engineering education initiatives. For example, there are four major **Engineering Education Coalitions** which focus on systemic education reform of undergraduate engineering education. They include programs focused on design and process engineering. There is also a body of awards focused on integrating research and education in technology areas to improve engineering curricula. There is also a program , Faculty Internships in Industry, to provide stipends for faculty to work on site in industry.

The **Model Institutions for Excellence** (MIE) Program is designed to materially enhance the capabilities of a small number of Historically Black Colleges and Universities (HBCUs) that are poised to make a substantial contribution to the Nation's goal of increasing the number of African-Americans who earn Natural Sciences, Engineering, and Mathematics (SEM) degrees and go on to enter graduate-level SEM degrees programs.

The HBCUs serves as models for successful recruitment, academic enrichment, early research experience, mentoring, counseling, orientation to graduate school, undergraduate retention, and production of quality SEM bachelor's degree recipients. Together they are characterized by a productive track record of awarding SEM bachelor's degrees, a strong commitment to SEM education and undergraduate research, and an existing infrastructure appropriate for launching a major enhancement of current efforts. Therefore, eligibility for participation in MIE is limited to those institutions that have demonstrated a strong commitment to SEM undergraduate education by:

- Being ranked among the top 50 HBCUs in the total number of SEM bachelor's degrees awarded to African-Americans (1985-1990);
- Having awarded at least 20% of their bachelor's degrees to African-Americans in the SEM fields (1985-1990); and,
- Having awarded an average of at least 40 bachelor's degrees per year (1985-1990) to African-Americans in the SEM fields.

In general, MIE provides support for activities that contribute to successful recruitment and retention of SEM undergraduates in the SEM pipeline from pre-college to graduate school. Students have the opportunity to receive tuition and stipend support and experience academic enrichment, early research, mentoring, counseling, and orientation to SEM graduate school. Projects are expected to produce quality SEM bachelor's degree recipients. High priority is accorded projects that involve commitment of non-Federal support to ensure their continuance beyond the NSF grant period.

Specifically, MIE:

- Provides an opportunity to define methods for improving HBCUs in SEM undergraduate education and research;
- Targets a small number of HBCUs that are poised to make a substantial contribution to the goal of increasing the number of African-Americans who earn SEM bachelor's degrees and go on to enter graduate-level SEM degree programs;
- Produces HBCUs that will serve as models for the successful recruitment, education and production of quality-trained SEM bachelor's degrees recipients; and,
- Constitutes an effective response to Executive Order 12677 which mandates the strengthening of HBCUs to provide high quality education and research and eliminate barriers that hinder them from participating in Federal programs.

D.8. National Aeronautics and Space Administration (NASA)

As part of its general charter to promote aeronautics and the exploration and use of space, the National Aeronautics and Space Administration develops a wide variety of aerospace technology that often has both government and commercial applications. Moreover, historically many of these technologies have been applied in fields outside of what is usually considered "aerospace", such as health care and consumer products.

A major portion of NASA's early stage R&D is supported by two offices at NASA Headquarters: the Office of Advanced Concepts and Technology and the Office of Aeronautics. (See descriptions below.) Other NASA offices also sponsor a broad range of potentially dual-use R&D. The actual R&D is primarily conducted through the nine NASA Field Centers working with firms and universities around the nation. The Field Centers are:

- Ames Research Center, Moffett Field, CA 94035
- Goddard Space Flight Center, Greenbelt, MD 20771
- Jet Propulsion Laboratory, Pasadena, CA 91109
- Johnson Space Center, Houston, TX 77058
- Kennedy Space Center, FL 32899
- Langley Research Center, Hampton, VA 23665
- Lewis Research Center, Cleveland, OH 44135
- Marshall Space Flight Center, AL 35812
- Stennis Space Center, MS 39529

Access to NASA technology and partnership formation is facilitated by the Technology Transfer Office at each Field Center as well as the NASA-sponsored National Technology Transfer Network. Another path to forming partnerships where firms and NASA jointly sponsor research at universities or non-profit research institutions is through the American Technology Initiative, Menlo Park, CA. 94025

Office of Advanced Concepts and Technology

The newly created Office of Advanced Concepts and Technology (OACT) combines NASA's strength in space technology R&D with a strong focus on technology transfer and commercialization. OACT's mission is: "To pioneer innovative, customer-focused space concepts and technologies, leveraged through industrial, academic, and government alliances, to ensure U.S. commercial competitiveness and preeminence in space."

Accordingly, OACT has four primary functions:

(1) Conduct systems-level feasibility and cost analysis of new ideas and advanced concepts
(2) Serve as NASA's front door to businesses who want NASA's help and expertise in developing new ideas and technologies
(3) Transfer NASA technology into the commercial sector
(4) Promote the commercial use of space

Some of the technology areas in which OACT is currently supporting R&D include:

- Aerothermodynamics
- Automation and Robotics
- Guidance, Navigation and Control/Avionics
- Humans in Space, including Ergonomics and Life Support
- Information and Communications
- Materials and Structures including Structural Dynamics and Control
- Rocket Propulsion
- Observational Systems including Optics and Sensors
- Space Power
- Thermal Management
- Manufacturing, System Test and Processing
- Materials Processing in Space
- Non-Destructive Evaluation, Inspection, and Testing
- Miniature Spacecraft and Microinstruments

OACT sponsors 8 University Space Engineering Research Centers as well as individual projects at many universities and institutes in order to help build the nation's long term base of space engineering talent and technology.

In the area of commercial space, one of OACT's major programs is its support for 17 Centers for the Commercial Development of Space at universities and non-profit research institutions. These centers are non-profit partnerships of industry, universities, and government that conduct space based, high technology R&D in areas ranging from materials processing to remote sensing.

With its Advanced Communication Technology Satellite Experiment Program, OACT is working to demonstrate potentially the next generation of communication satellite technology. OACT is also improving access to space through the commercial provision of space services with its COMET and Spacehab programs. The ultimate goal of all these efforts is to help promote economic growth through the commercial exploitation of space resources.

OACT has overall management responsibility for NASA's Technology Transfer Program, including the NASA-sponsored National Technology Transfer Network, the Applications Engineering Projects, *NASA Tech Briefs* and other programs. OACT also coordinates NASA's Small Business Innovation Research (SBIR) and Independent Research and Development (IR&D) programs, which help develop new technology across a broad base of industries and firms.

Office of Aeronautics

The Office of Aeronautics is responsible for strategy, planning, direction, execution and evaluation of NASA's Aeronautics program, which includes the entire Aeronautic R&T effort, the High Performance Computing and Communications program, and the National Aero-Space Plane program. NASA's Aeronautics Team is responsible for ensuring that NASA fulfill its chartered obligations which include the following:

- Preserve the role of the U.S. as leader in aeronautical science and technology, and applications thereof.
- Improve the usefulness, performance, speed, safety, and efficiency of aeronautical vehicles.
- Supervise and direct the scientific study of the problems of flight, with a view to their practical solution.
- Ensure the timely provision of a proven technology base for a safe, efficient, environmentally compatible air transportation system.
- Provide the line institutional management of Ames Research Center, the Ames-Dryden Flight Facility, the Langley Research Center, and the Lewis Research Center.

The vision of the NASA Aeronautics Program is to be the world leader in pioneering high-payoff, critical technologies with effective transfer of products to industry, DoD, and FAA for application to superior U.S. civil and military aircraft, and for a safe and uncongested national aviation system. This vision is supported by six strategic thrusts defined below:

Subsonic Transportation

Develop selected, high-leverage technologies and explore new means to ensure the competitiveness of U.S. subsonic aircraft and to enhance the safety and productivity of the National Aviation System.

High Speed Research

Resolve the critical environmental issues and establish the technology foundation for economical, high-speed air transportation.

High Performance Aircraft & Flight Projects

Ready the technology options for revolutionary new capabilities in future high-performance aircraft. Provide national flight research leadership in exploring and pioneering new concepts, maturing and accelerating emerging technologies, and validating technologies to reduce technical uncertainty.

National Aero-Space Plane

Develop critical technologies to support ground and flight demonstration of the X-30 National Aero-Space Plane and to support development of future hypersonic vehicles.

Aeronautics Research

Pioneer the development of innovative concepts, and provide the physical understanding and the theoretical, experimental, and computational tools required for the efficient design and operation of advanced aerospace systems.

High Performance Computing and Communications

Accelerate the development and application of high performance computing technologies to meet NASA science and engineering requirements in concert with the Federal High Performance Computing and Communications Program.

APPENDIX E

SUMMARY OF FUNDING INSTRUMENTS[1]

A wide variety of contractual vehicles (contracts, grants, cooperative agreements, and other transactions) is needed to provide the flexibility that is needed in the R&D environment. In the science and technology arena, the objectives to be met often cannot be described precisely in advance. It may be difficult to judge the level of effort required or the likelihood of success. Extensive involvement of government personnel may be required, and the sharing of costs or resources may be desirable. Flexibility in the allocation of rights to intellectual property (patents, trademarks, copyrights, trade secrets) may be necessary to induce participation, particularly by the for-profit sector.

Contracts—more precisely, "procurement contracts"—are used in R&D only when the primary purpose is to acquire supplies and services for the direct benefit of the Federal Government, not to advance the state of the art, improve the technology base, or demonstrate the feasibility of a new technology. The nature of R&D activities will generally preclude the use of fixed-price contracts, making cost-reimbursement contracts the norm in those situations in which procurement contracts are used. It is anticipated that no procurement contracts will be used in the Technology Reinvestment Project programs except as may be required for SBIR projects.

Grants and 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. A grant is appropriate when the degree of involvement of the government agency is not expected to be substantial; substantial government involvement calls for a cooperative agreement instead. In both cases, the procurement contract regulations generally do not apply, so there is flexibility about such things as, for example, intellectual property rights. It is anticipated that some of the awards made under the Technology Reinvestment Project programs will result in grants or in cooperative agreements (but not in "Cooperative Research and Development Agreements"—CRADA's—under the Federal Technology Transfer Act of 1986).

"Other transactions" are just that-any form of transaction that is not a grant, contract or cooperative agreement. These may include (but are certainly 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, and it is anticipated that most DTCC awards will result in such cooperative agreements and "other transactions."

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1 The contracting authorities and policies of the DTCC participating agencies are not all identical. For example, NIST has authority to award "contracts including cooperative research and development arrangements" and interprets the word "arrangements" differently than ARPA interprets "transactions" in its statutes. This discussion is based on ARPA's authority and is applicable, for the most part, to the other agencies.

APPENDIX F
STATUTES RELATING TO DEFENSE CONVERSION

F.1. STATUTORY DEFINITIONS OF TERMS (10 U.S.C. § 2491)

"In this chapter:

"(1) The term 'national technology and industrial base' means the persons and organizations that are engaged in research, development, reduction, or maintenance activities conducted within the United States and Canada.

"(2) The term 'dual-use' with respect to products, services, standards, processes, or acquisition practices, means products, services, standards, processes, or acquisition practices, respectively, that are capable of meeting requirements for military and nonmilitary application.

"(3) The term 'dual-use critical technology' means a critical technology that has military applications and nonmilitary applications.

"(4) The term 'technology and industrial base sector' means a group of public or private persons and organizations that engage in, or are capable of engaging in, similar research, development, or production activities.

"(5) The terms 'Federal laboratory' and 'laboratory' have the meaning given the term 'laboratory' in section 12(d)(2) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. § 3710a(d)(2)).

"(6) The term 'critical technology" means a technology that is-

"(A) a national critical technology; or

"(B) a defense critical technology.

"(7) The term 'national critical technology' means a technology that appears on the list of national critical technologies contained in the most recent biennial report on national critical technologies submitted to Congress by the President pursuant to section 603(d) of the National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. § 6683(d)).

"(8) The term 'defense critical technology' means a technology that appears on the list of critical technologies contained, pursuant to [10 U.S.C. § 2505(f)] of this title, in the most recent national technology and industrial base assessment submitted to Congress by the Secretary of Defense pursuant to [10 U.S.C. § 2506(e)] of this title.

"(9) The term 'eligible firm' means a company or other business entity that, as determined by the Secretary of Commerce—

"(A) conducts a significant level of its research, development, engineering, and manufacturing activities in the United States; and

"(B) is a company or other business entity the majority ownership or control of which is by United States citizens or is a company or other business of a parent company that is incorporated in a country the government of which—

"(i) encourages the participation of firms so owned or controlled in research and development consortia to which the government of that country provides funding directly or provides funding indirectly through international organizations or agreements; and

"(ii) affords adequate and effective protection for the intellectual property rights of companies incorporated in the United States.

Such term includes a consortium of such companies or other business entities, as determined by the Secretary of Commerce.

"(10) The term 'manufacturing technology' means techniques and processes designed to improve manufacturing quality, productivity, and practices, including quality control, shop floor management, inventory management, and worker training, as well as manufacturing equipment and software.

"(11) The term 'manufacturing extension program' means a public or private, nonprofit program for the improvement of the quality, productivity, and performance of United States-based small manufacturing firms in the United States.

"(12) The term 'United States-based small manufacturing firm' means a company or other business entity that, as determined by the Secretary of Commerce—

"(A) engages in manufacturing;

"(B) has less than 500 employees; and

"(C) is an eligible firm."

"(b) Transition Provision.—Until the first national technology and industrial base assessment is submitted to Congress by the Secretary of Defense pursuant to section 2506(e) of title 10, United States Code, as added by section 4216, the term "defense critical technology" for the purposes of chapter 148 of such title, as added by section 4202, shall have the meaning given such term in section 2521 of title 10, United States Code, as in effect on the day before the date of the enactment of this Act."

F.2. CONGRESSIONAL DEFENSE POLICY CONCERNING NATIONAL TECHNOLOGY AND INDUSTRIAL BASE, REINVESTMENT, AND CONVERSION (10 U.S.C. § 2501)

"2501. Congressional defense policy concerning national technology and industrial base, reinvestment, and conversion

"(a) DEFENSE POLICY OBJECTIVES FOR NATIONAL TECHNOLOGY AND INDUSTRIAL BASE.—It is the policy of Congress that the national technology and industrial base be capable of meeting the following national security objectives:

"(1) Supplying and equipping the force structure of the armed forces that is necessary to achieve—

"(A) the objectives set forth in the national security strategy report submitted to Congress by the President pursuant to section 104 of the National Security Act of 1947 (50 U.S.C. 404a);

"(B) the policy guidance of the Secretary of Defense provided pursuant to [10 U.S.C. § 113(g)]; and

"(C) the future-years defense program submitted to Congress by the Secretary of Defense pursuant to [10 U.S.C. § 221].

"(2) Sustaining production, maintenance, repair, and logistics for military operations of various durations and intensity.

"(3) Maintaining advanced research and development activities to provide the armed forces with systems capable of ensuring technological superiority over potential adversaries

"(4) Reconstituting within a reasonable period the capability to develop and produce supplies and equipment, including technologically advanced systems, in sufficient quantities to prepare fully for a war, national emergency or mobilization of the armed forces before the commencement of that war, national emergency, or mobilization.

"(b) POLICY OBJECTIVES RELATING TO DEFENSE REINVESTMENT, DIVERSIFICATION, AND CONVERSION.—It is the policy of Congress that, during a period of reduction in defense

expenditures, the United States further the national security objectives set forth in subsection (a) through programs of reinvestment, diversification, and conversion of defense resources that—

"(1) promote economic growth in high-wage, high-technology industries and preserve the industrial and technical skill base;

"(2) promote economic growth through further reduction of the Federal budget deficit and thereby free up capital for private investment and job creation in the civilian sector;

"(3) bolster the national technology base, including support and exploitation of critical technologies with both military and civilian application;

"(4) support retraining of separated military, defense civilian, and defense industrial personnel for jobs in activities important to national economic growth and security;

"(5) assist those activities being undertaken at the State and local levels to support defense economic reinvestment, conversion, adjustment, and diversification activities; and

"(6) assist small businesses adversely affected by reductions in defense expenditures.

"(c) CIVIL-MILITARY INTEGRATION POLICY—It is the policy of Congress that the United States attain the national technology and industrial base objectives set forth in subsection (a) through acquisition policy reforms that have the following objectives:

"(1) Relying, to the maximum extent practicable, upon the commercial national technology and industrial base that is required to meet the national technology and industrial base that is required to meet the national security needs of the United States.

"(2) Reducing the reliance of the Department of Defense on technology and industrial base sectors that are economically dependent on Department of Defense business.

"(3) Reducing Federal Government barriers to the use of commercial products, processes, and standards."

F.3. NATIONAL TECHNOLOGY AND INDUSTRIAL BASE PERIODIC DEFENSE CAPABILITY PLAN (10 U.S.C. § 2506)

§ 2506. National technology and industrial base: periodic defense capability plan

"(a) IN GENERAL.—The National Defense Technology and Industrial Base Council shall prepare annually through fiscal year 1997 and biennially thereafter a multiyear plan for ensuring, to the maximum extent practicable, that the policies and programs of the Department of Defense, the Department of Energy, and other departments and agencies of the Federal Government are planned, coordinated, funded, and implemented in a manner designed to attain each of the national security objectives set forth in [10 U.S.C. § 2501(a)]. In preparing each plan, the Council shall take into account the most recent national technology and industrial base assessment prepared pursuant to [10 U.S.C. § 2505].

"(b) PROGRAM GUIDANCE TO BE INCLUDED IN PLAN.—Each plan under subsection (a) shall also provide specific guidance (including goals, milestones, and priorities) for the following:

"(1) National defense programs and policies of the Department of Defense and Department of Energy that are necessary to ensure the continued viability of each technology and industrial base sector that is necessary to support the objectives stated in section [10 U.S.C. § 2501(a)].

"(2) National defense programs and policies of the Department of Defense and Department of Energy that are necessary in each such sector—

"(A) to reduce dependence on foreign sources that could create a military vulnerability; and

"(B) to provide for alternative sources in the event that the foreign sources become unavailable.

"(3) The composition and management of the Defense Industrial Reserve under [10 U.S.C. § 2535].

"(4) National defense programs and policies of the Department of Defense and Department of Energy relating to manufacturing technology.

"(5) Development of each defense critical technology.

"(6) Ensuring that financial policies of the Department of Defense and Department of Energy (for national security programs) are designed to meet the policies set forth in [10 U.S.C. § 2501].

"(7) Encouragement of the effective us of commercial products and processes by the Department of Defense and the Department of Energy for national security programs.

"(8) For each plan through fiscal year 1997, national defense programs and policies of the Department of Defense and Department of Energy relating to the transition from economic dependence on defense expenditures of those technology and industrial base sectors and businesses that are at least partially dependent economically on defense expenditures.

"(9) Enhancement of the skills and capabilities of the work force in the national technology and industrial base in support of the national security objectives set forth in [10 U.S.C. § 2501(a)].

"(10) Enhancement of the effectiveness of the major defense acquisition program regulations prescribed pursuant to [10 U.S.C. § 2430(b)].

"(c) LONG-RANGE PLANS.—Each plan through fiscal year 1997 shall include the following:

"(1) A long-range plan for technology development and use of model demonstration defense facilities for environmental restoration and waste management.

"(2) A long-range plan to develop advanced technology to carry out transportation projects that further the national security objectives set forth in [10 U.S.C. § 2501(a)].

"(3) A long-range national security energy technology plan to further the national security objectives of [10 U.S.C. § 2501(a)].

"(4) A long-range national defense communications networking plan to further the national security objectives of [10 U.S.C. § 2501(a)].

"(d) ACQUISITION REFORM GUIDANCE.—Each plan shall include—

"(1) recommendations for legislation that the Council considers appropriate for eliminating any adverse effect of Federal law on the capability of the national technology and industrial base to further the national security objectives set forth in [10 U.S.C. § 2501(a)]; and

"(2) specific guidance to ensure that maximum use is made of authority to waive regulations or conduct test programs in pursuit of such objectives.

"(e) ISSUANCE.—(1) The Secretary of Defense shall provide the plan to the Secretaries of the military departments and the heads of the other elements of the Department of Defense not later than the date on which the Secretary provides those officials with the guidance required by [10 U.S.C. § 113(g)(1)].

"(2) The Secretary of Defense shall transmit to Congress, not later than March 31 of each year through 1997 and every odd-numbered year thereafter—

"(A) the plan prepared under this section, including any changes necessary to reflect the budget submitted by the President during that year under section 1105 of title 31; and

"(B) the national technology and industrial base periodic assessment prepared pursuant to section 2505 of [Title 10] that pertains to such plan and budget.

"(3) The plan and assessment shall be submitted to Congress in classified and unclassified forms. Proprietary information that may be withheld from disclosure under section 552 of title 5 shall be provided only in the classified version."

APPENDIX G
PLANNED DEFENSE TECHNOLOGY CONVERSION COUNCIL POLICIES

G.1. INTELLECTUAL PROPERTY RIGHTS

(1) **Property Rights in Inventions**

(a) The disposition of rights in inventions made by small business firms and educational and other nonprofit organizations under contracts, grants, and cooperative agreements (including subcontracts thereunder) for the performance of experimental, developmental, or research work funded under the programs shall be governed by Chapter 18 of Title 35, United States Code. The disposition of rights to inventions made by other than a small business firm or nonprofit organization under contracts, grants, or cooperative agreements (including subcontracts thereunder) in the performance of experimental, developmental, research, design, or engineering work under the programs will be governed by the Presidential Memorandum on Government Patent Policy to the Heads of Executive Departments and Agencies Dated February 18, 1983, and Section 1(b)(4) of Executive Order 12591, dated April 10, 1987. The implementation of the requirements of Chapter 18 of Title 35, United States Code, for grants and cooperative agreements is set forth in 37 C.F.R. 401.

(b) The clause required by 37 C.F.R. 401.414, customized pursuant to 37 C.F.R. 401.5, shall apply to all grants and cooperative agreements unless either: (a) the party to the agreement is not located in the United States or does not have a place of business in the United States or is subject to the control of a foreign government; or (b) the party to the agreement is not a nonprofit organization or an alternate provision is to be used in accordance with 37 C.F.R. 401.3.

(c) In the 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 the national security objectives of Section 2501 of Title 10, United States Code.

(2) **Intellectual Property in General**

Intellectual property issues other than those specified in the preceding section will be appropriate subject matter for negotiation in agreements. 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 of Section 2501 of Title 10, United States Code.

G.2. COST SHARING

1. Each of the statutory programs includes a requirement that program funds be matched in whole or in part by funds provided by the participants in each project. Some programs require that either the DoD funds or the Federal funds provided to a program cannot exceed the amount of non-DoD or non-Federal funds in any program year (in some cases allowing for the possibility of non-DoD Federal funding in addition to program funding). In other programs, the DoD contribution is limited to 50% of project costs in the first year, 40% in the second year, and 30% in the third and all subsequent year. The specific matching amount requirements of each program are set forth in the statute creating the program and summarized in Appendix B.

II. That portion of project costs not borne by the DoD or the Federal Government, as specified by statute, under one of the programs is available for cost sharing or matching subject to requirements discussed below. Such costs can include:

(a) Cash contributions from:

(1) Project participants and third parties, including states, counties, cities, companies, or other sources,

(2) Revenue from license fees and royalties,

(3) Fees for services performed,

(b) In-kind contributions:

(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,

(3) In-kind value of land, buildings, or space, necessary and reasonable for proper and efficient accomplishment of project objectives.

III. The following principles apply:

(a) Guidelines:

(1) Cash, in order to be acceptable, must not be included as contributions for any other federally-assisted program, and must be necessary and reasonable for proper and efficient accomplishment of project objectives.

(2) In-kind contributions may include in-kind contributions from Federal agencies, other than DoD, to projects in those programs whose authorizing statute states matching requirements in terms of DoD funds, rather than Federal funds.

(3) A participant's contribution may include independent research and development (IR&D) effort if authorized by FAR 31.205-18(e), which permits IR&D in certain kinds of cooperative arrangements involving contractors working jointly with one or more non-Federal entities (e.g., joint ventures, limited partnerships, teaming arrangements, and collaboration and consortium arrangements) and if the work performed would have been allowed as contractor IR&D had there been no cooperative arrangement.

(4) The cost of technology transfer activities may be included in a participant's contribution subject to a mutually agreed evaluation of the value of such activities to the Partnership made in advance.

(5) The in-kind value of equipment (including software) may include either the purchase cost of new equipment or the depreciated value of previously purchased equipment. The depreciation method to be used for the matching fund determination shall be the internal depreciation accounting method used by the participant for the equipment prior to the award. The value of the equipment will be further pro-rated according to the share of total use dedicated to carrying out the project. The total value of equipment expenditures allowable under the match may be applied in the award year expended or prorated over the duration of the award.

(7) The in-kind value of space (including land or buildings) shall not exceed its fair rental value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

(b) Advance Agreements: Participants are encouraged to negotiate in advance a mutual understanding on the cost treatment of in-kind contributions with the Government prior to the execution of the financial instrument.

(c) A participant's contribution may include revenues from any non-DoD source, including non-Federal contracts or grants. Profit or fee from a Federal contract shall be included unless proposed as the participant cash contribution.

IV. Record Keeping and Documentation

(a) Except as otherwise mutually agreed in advance between the participant and the Government, each participant shall maintain records of the costs it claims as contribution in accordance with generally accepted accounting practices.

(b) For all non-cash contributions which are not subject to an advance agreement, the participant shall document the method of calculating fair market value.

G.3. Proposed Matching Regulation for Commercial-Military Integration Partnerships

Section 1. General Rule

The Department of Defense (DoD) share of the cost of any Commercial-Military Integration Partnership (whether the funding instrument be grant, contract, cooperative agreement or other transaction) shall not exceed 50% in the first year, 40% in the second year, and 30% in the third and subsequent years.

The non-DoD share of any project may be in cash or in-kind. In determining the amount of any non-DoD share, the fair market value of services and facilities contributed from non-DoD sources may be considered.

Section 2. Determination of Shared Costs

Section 2.1. Federal Share

(a) The DoD share of Partnership costs shall be obligations under the funding instrument.

(b) A participant's contribution may include revenues from any non-DoD source, including non-Federal contracts or grants. Profit or fee from a Federal contract shall be included unless proposed as the participant cash contribution.

Section 3. Record Keeping and Documentation

(a) Except as otherwise mutually agreed in advance, each participant shall maintain records of the costs it claims as contribution in accordance with generally accepted accounting practices.

(b) For all non-cash contributions which are not subject to an advance agreement, the participant shall document the method of calculating fair market value.

G.4. Historically Black Colleges and Universities (HBCU) and Minority Institutions (MI)

Historically Black Colleges and Universities (HBCU) and Minority Institutions (MI) are encouraged to participate in all programs for which they are eligible to participate. In cases where the evaluation of proposals is substantially equal, preference for award will be given to those proposals which include HBCU's and MI's as participants over those which do not include HBCU's and MI's.

APPENDIX H

COMMERCE BUSINESS DAILY AND FEDERAL REGISTER PROGRAM ANNOUNCEMENTS

SPECIAL NOTICE - DEFENSE TECHNOLOGY CONVERSION, REINVESTMENT, AND ASSISTANCE

PROGRAM ANNOUNCEMENT #PA93-21.

DATE: 031293.

1-800-DUAL-USE, (8:00AM through 7:00 PN EST, Monday - Friday)

PROGRAM ANNOUNCEMENT (PA#93-21): DEFENSE TECHNOLOGY CONVERSION, REINVESTMENT, AND TRANSITION ASSISTANCE THIS IS A PROGRAM

ANNOUNCEMENT -- THIS IS NOT A SOLICITATION FOR PROPOSALS. An official solicitation is planned for publication in both the COMMERCE BUSINESS DAILY and the FEDERAL REGISTER in late May with full proposals due in July. Initial awards will be announced as early as September 1993. This announces plans for the execution of the technology portion of the Defense Conversion, Reinvestment, and Transition Act of 1992 . This is a broad-reaching program that will invest $600 million (including some FY 1992 funds) in dual-use technology partnerships, manufacturing technology, regional technology alliances, manufacturing extension and assistance programs, and manufacturing education initiatives. The effort is being planned and conducted by the Technology Reinvestment Project (TRP), an interagency team lead by the Department of Defense (Advanced Research Projects Agency), which includes the Department of Commerce (through NIST), Department of Energy (Defense Programs), National Aeronautics and Space Administration, and the National Science Foundation. Funds will be invested (as outlined below) to develop critical dual-use technologies, deploy existing technologies which address defense needs and have potential for commercial viability, and stimulate the integration of military and commercial research and production bases. A total of eleven programs are authorized under Title IV of the FY 1993 DoD Authorization Act. three of these programs--Agile Manufacturing and Enterprise Integration ($30 million), Advanced Materials Synthesis and Processing ($30 million), and (U.S. Japan Management Training ($10 million)--will be executed by mechanisms outside of this announcement. Each of the remaining eight statutory programs covered in this announcement has a unique focus, however, three statutory requirements remain: o All programs require competitive awards. o All programs have specific requirements on the types of proposing and participating organizations. o All require cost sharing of at least 50%. The eight programs covered in this announcement are: 1. Defense Dual Use Critical Technology Partnerships will support the research and development of critical technologies that meet defense needs and have commercial potential. 2 Commercial-Military Integration Partnerships will develop and mature dual-use technologies with clear commercial viability in an potential military applications. 3. The Regional Technology Alliances Assistance Program will support regional efforts to apply and commercialize critical dual-use technologies. These alliances will bring state, industry and federal resources together to provide key infrastructural service to regional clusters of associated firms. 4. Defense Advanced Manufacturing Technology Partnerships will encourage research and development of advanced manufacturing technologies with the potential for a broad range of military and dual-use applications. 5. The Manufacturing Extension Program will assist small manufacturers in upgrading their capabilities to serve both commercial and defense needs. Modeled after the Agricultural Extension Service, this effort will build on manufacturing extension programs sponsored by regional, state, or local governments and private, nonprofit organizations. 6. The Dual-Use Assistance

Extension Program will assist businesses economically dependent on Department of Defense expenditures to acquire dual-use capabilities through a variety of assistance mechanisms. 7. The Manufacturing Engineering Education Grant Program will support the enhancement of existing programs and the establishment of new programs in manufacturing engineering education and training. Grants will be made under this program to institutions of higher education and consortia of such institutions. Eligible firms and other support entities may participate. 8. Manufacturing Experts in the Classroom will support teaching, curriculum development, and other activities of manufacturing experts at institutions of higher education. Eligible firms and other support entities may participate in this program. As mandated by Public Law 102-564, 1.5% of all program funds is set aside for Small Business Innovative Research (SBIR). The TRP will solicit, separate from the existing SBIR programs of the participating agencies, Phase I proposals that address scientific and technical innovation in areas specifically identified as relevant to the Technology Reinvestment Project. The eight statutory programs will involve key R&D and service activities. Each activity is designed to stimulate the integration of the military and commercial industrial bases as follows: Technology Development Activities will create new or apply existing technologies to demonstrate the viability of new products and processes and include (l) Spin-off activities that demonstrate commercial feasibility of technologies originally developed for defense, (2) Dual-Use activities that develop technologies that have both defense and commercial utility, and (3) Spin-on activities that demonstrate the defense feasibility of technologies already developed commercially. Technology Deployment Activities will disseminate existing technology for commercial and military products and processes and involve: (l) Manufacturing Extension Service activities that target small business with an emphasis on assisting enterprises currently dependent upon defense to increase their competitiveness through technical and management advancement, redirection or restructuring of business practices, assistance in accessing training and consulting services, and the transition of technologies from research to commercially viable products and processes, (2) Extension Enabling Services that demonstrate activities that link together providers of extension services with each other as well as with the developers of technology, (3) Alternate Deployment Pilot Projects that explore innovative modes of technology deployment which are alternatives to traditional extension services, and (4) Technology Access Services to assist the private sector to acquire existing and emerging dual-use and commercial technologies from defense and government sources. Manufacturing Education and Training Activities will strengthen education and work force capabilities necessary to maintain and improve competitive industrial bases--ideas that improve the general state of U.S. competitiveness and productivity and provide a high quality work force for the 21st century. Emphasis will be on teaming of industry and organizations of higher education to enhance the development of dual-use technical capabilities at the university, college, and vocational levels. The use of experienced manufacturing experts and engineers in classroom settings, including the structuring of alternative curricula, will be encouraged. Regional meetings are planned for the week of April 12-17 in New York, NY, Orlando, FL, Dallas, TX, Detroit, MI, and Los Angeles, CA. Specific times and locations will be published as details become available. THIS IS A PROGRAM ANNOUNCEMENT -- THIS IS NOT A SOLICITATION FOR PROPOSALS. An official solicitation is planned for publication in both the COMMERCE BUSINESS DAILY and the FEDERAL REGISTER in late May with full proposals due in July. Questions at this time will not be accepted, however as indicated in the Program Information Package, ample opportunity for dialogue will be provided prior to the official release of the solicitation. Interested parties are invited to request a complete Program Information Package. To obtain a complete information package: Call -- 1-800-DUAL-USE, (8:00 AM through 7:00 PM EST, Monday through Friday) or Write -- The Technology Reinvestment Program, 3701 N. Fairfax Drive, Arlington, Va. 22203-1714, or Fax -- 703-461-2372 (Addressed to: TRP, PA 93-21), or Electronic Mail -- Internet Address: PA93-2l@darpa.mil Interested parties may expect the Program Information Package within ten (10) days from written or oral request unless overnight mail account information is provided.

APPENDIX I
GLOSSARY OF TERMS

In developing the defense conversion program strategy and this announcement, it was necessary for the Agencies involved in Defense Conversion to agree on specific definitions for certain terms. These are summarized here to aid potential proposers in understanding the program information package and in hope of establishing a common language between proposers and the review teams that will evaluate proposals. Some of these terms are defined by statute in Appendix F and are repeated here for convenience.

Activity Area in this program information package means a set of activities with associated selection criteria grouped according to Technology Development, Technology Deployment, or Manufacturing Education and Training.

Commercial product or process technology means a product or process technology that is capable of being traded, purchased or sold in a market serving private sector customers.

Dual-use with respect to products, services, standards, processes, or acquisition practices, means products, services, standards, processes, or acquisition practices, respectively, that are capable of meeting requirements for defense and nondefense application.

Federal laboratory and **laboratory** have the meaning given the term 'laboratory' in section 12(d)(2) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. § 3710a(d)(2)).

Eligible firm means a company or other business entity that, as determined by the Secretary of Commerce—

(a) conducts a significant level of its research, development, engineering, and manufacturing activities in the United States; and

(b) is a company or other business entity the majority ownership or control of which is by United States citizens or is a company or other business of a parent company that is incorporated in a country the government of which—

(i) encourages the participation of firms so owned or controlled in research and development consortia to which the government of that country provides funding directly or provides funding indirectly through international organizations or agreements; and

(ii) affords adequate and effective protection for the intellectual property rights of companies incorporated in the United States.

Such term includes a consortium of such companies or other business entities, as determined by the Secretary of Commerce.

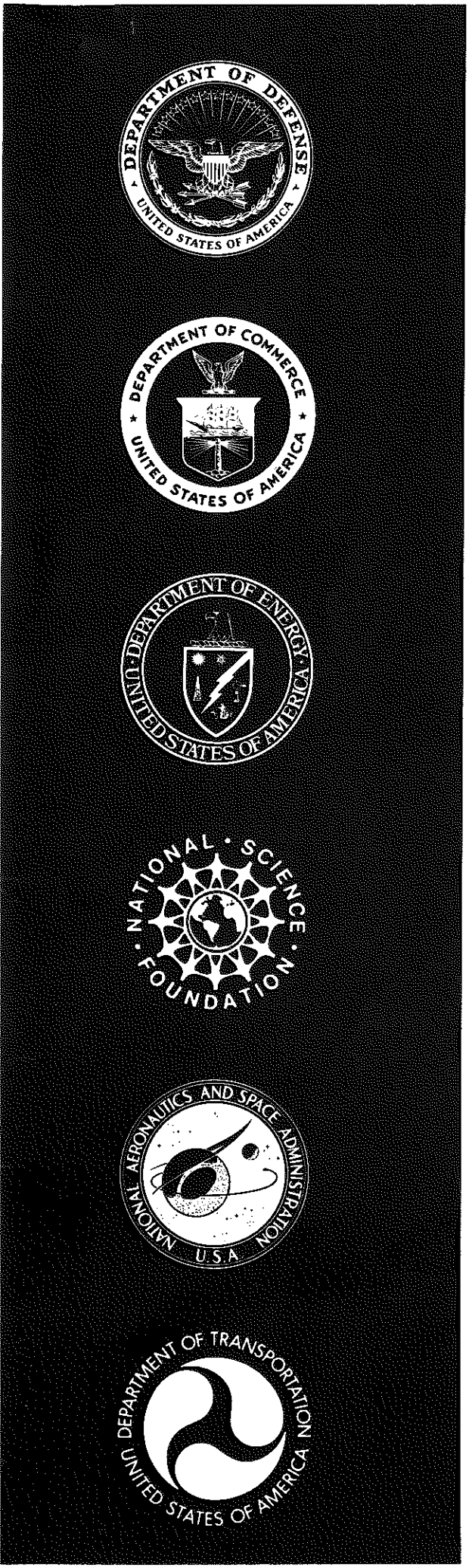
Manufacturing covers a wide range of technologies and concepts, encompassing the breadth of materials, products, and processes upon which the American industrial enterprise is based. These range from chemical and biotechnology processing to electronic component and system fabrication, durable goods production, and other sectors.

Manufacturing technology means techniques and processes designed to improve manufacturing quality, productivity, and practices, including quality control, shop floor management, inventory management, and worker training, as well as manufacturing equipment and software.

Manufacturing extension program means a public or private, nonprofit program for the improvement of the quality, productivity, and performance of United States-based small manufacturing firms in the United States.

Program in this program information package means a statutory Technology Reinvestment Project program under the Defense Conversion, Reinvestment, and Transition Assistance Act of 1992 and other legislation.

United States-based small manufacturing firm means a company or other business entity that, as determined by the Secretary of Commerce: (a) engages in manufacturing; (b) has less than 500 employees; and, (c) is an eligible firm.



ARPA

Program Information Package for Technology Reinvestment Project Focused Competition

Dual Use Technologies
TECHNOLOGY REINVESTMENT PROJECT
National Security • Economic Growth

April 1994

FOR INFORMATION AND PLANNING PURPOSES ONLY: NOT A SOLICITATION

ADVICE TO PROPOSERS

This Program Information Package describes an upcoming planned competition that differs in a number of significant respects from the competition announced by the Technology Reinvestment Project (TRP) on March 10, 1993. Its scope will be much more limited in terms of the amount of funding available, the technology focus areas in which Technology Development proposals will be sought, and the Activities for which Technology Deployment proposals will be accepted. *Manufacturing Education and Training and Small Business Innovation Research (SBIR) will not be included in this competition.* To minimize potential proposers' costs and to maximize their possibility of success, TRP asks that you carefully consider the following information—for which further details are contained in this Program Information Package—in deciding whether to participate:

1. **In Technology Development, only proposals that clearly fall within the definition of one of seven very specific technology focus areas will be considered for award.**
2. **In Technology Deployment, only proposals for Manufacturing Extension Centers will be solicited.**
3. **TRP Programs have specific participation requirements. TRP Development Programs call for at least two eligible firms (as defined by statute).**
4. **Cost sharing of at least 50 percent is a requirement of all TRP Programs. Cost sharing of 50 percent in year one, 60 percent in year two, and 70 percent in years three and beyond is a requirement of Commercial-Military Integration Partnerships.**
5. **All proposals will be evaluated solely on their individual merit. The concept of "associated proposals" used in the FY1993 TRP competition will not apply.**
6. **Under certain circumstances, funds received under the SBIR Program and Small Business Technology Transfer (STTR) Pilot Program may be used for cost sharing by small business participants in TRP projects. This results from statutory changes enacted by Congress to the TRP Program statutes.**

A second competition, including Technology Development, Technology Deployment, Manufacturing Education and Training, and SBIR is planned for the summer of 1994. This later competition is expected to include both Fiscal Year 1994 and Fiscal Year 1995 funds appropriated to TRP Programs.

INTRODUCTION

The mission of the Technology Reinvestment Project (TRP) is to stimulate the transition to a growing, integrated, national industrial capability that provides the most advanced, affordable, military systems and the most competitive commercial products. Programs are structured to expand high quality employment opportunities in dual-use technologies that demonstrably enhance U.S. competitiveness and national security. The TRP mission is accomplished by:

- focusing defense and commercial resources on the development of dual-use product and process technologies,
- support of manufacturing and technology assistance to small firms, and
- promotion of education and training programs that enhance U.S. manufacturing engineering and target displaced defense industry workers.

In Fiscal Year (FY) 1993 competition, the TRP selected 212 proposals for award negotiations for over $600 million in Federal funds. In FY 1994, the TRP plans to conduct two, separate competitions. The first, the subject of this Program Information Package, is termed the "Focused Competition." It will solicit proposals in a limited number of tightly defined Technology Development focus areas that complement and supplement those of the 1993 TRP competition as well as Technology Deployment efforts related to Manufacturing Extension Centers. The second will be the subject of a subsequent information package and will be announced in early Summer of 1994.

The TRP is implemented through the multi-agency Defense Technology Conversion Council (DTCC) chaired by the Advanced Research Projects Agency (ARPA), and whose members are the Departments of Defense, Commerce, Energy, and Transportation, the National Aeronautics and Space Administration, and the National Science Foundation. The TRP is divided into three related activity areas: **Technology Development** to promote the development of dual-use technologies; **Technology Deployment** to establish links between existing technology capabilities for small and medium-sized businesses; and, **Manufacturing Education and Training** to establish programs for the retraining of Defense workers and improvement of the manufacturing curriculum in U.S. colleges and universities.

Four requirements are common to all TRP efforts.

Defense relevance: All efforts selected by TRP must provide an improvement (capability, affordability, etc.) necessary to meet DoD requirements. In Technology Development, commercial development of a technology without this relevance is not within the scope of TRP. Technology Deployment efforts provide assistance to the small and medium-sized businesses that are the backbone of the Defense industry.

Specific partnership requirements: For each TRP Technology Development effort, a partnership must be formed which has the breadth of experience and capabilities to carry out the project. The TRP Deployment efforts also have restrictions on who can propose.

Mandated cost sharing of at least fifty percent (50 percent) by the private sector: Since the benefits to DoD from TRP efforts are only realized in the long-term, it is necessary that the proposer show a real commitment to carry the effort through. Sharing the cost also shares the risk, providing an incentive for the proposers' follow through until completion.

Competitive selection: The language authorizing TRP funding requires that all proposals be selected competitively. TRP will make no awards that are not selected via a competition.

NOTE

Manufacturing Education and Training and Small Business Innovation Research (SBIR) will not be included in this Focused Competition. Both are to be included in a second TRP competition planned for the summer of 1994. An announcement of this competition is expected to be made in early summer of 1994. This second competition will also include Technology Development and Technology Deployment activities.

1. PACKAGE DESCRIPTION AND COMPETITION SCHEDULES

1.1. What is Contained in this Program Information Package

This Information Package describes a planned, upcoming competition (referred to as the "Focused Competition") for Technology Development and Technology Deployment proposals under four of the eight TRP statutory Programs.[1]

This Information Package provides information useful in:

- determining whether to propose into Technology Development or Technology Deployment
- (for Technology Development) identifying a technology focus area for your proposal
- (for Technology Development) selecting a Program appropriate to your proposal,
- structuring a team, and
- addressing cost sharing and other statutory requirements.

Separate sections describe the requirements of the Technology Development (Section 2) and Technology Deployment (Section 3) activities. Instructions and policies that apply to various aspects of the TRP relevant to both are in Section 4 and Appendix A. The text of the Commerce Business Daily Announcement published on April 8, 1994, appears in Appendix B.

1.2. Focused Competition Schedule

The following schedule is **planned** and is **subject to change**.

• April 8, 1994	This Announcement published in Commerce Business Daily.
• May 20, 1994	Solicitation (referred to as the "Focused Solicitation") published in Commerce Business Daily. TRP outreach activities end.
• June 30, 1994	**Planned deadline** for receipt of proposals.

Announcement of proposals selected for negotiation is expected before the end of Fiscal Year 1994.

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1 In this Information Package the term *Program* refers to one of four statutory programs enacted or amended by Congress in fiscal year 1993 and funded by the fiscal year 1994 Defense Appropriations Act. See Section 2.3.

2. TECHNOLOGY DEVELOPMENT ACTIVITY AREA COMPETITION

2.1. Limitation on Technology Development Focus Competition

Technology Development activities deal with the creation of new product and process technologies and the exploration of their potential for commercial and defense applications. It is intended that these activities will result in applied technology development which will lead to products in a 2 to 5 year time frame. *Proposals that involve either basic research or final product development beyond the stage of product prototype or feasibility demonstration will not be acceptable.*

The Technology Development competition described in this section will seek proposals for a limited set of technology focus areas described in detail below. Proposals not falling into one of these focus areas will be deemed to be outside the scope of the competition. There is no "other" category in the planned competition. Note that each focus area description contains a government point of contact and workshop information. Potential proposers are strongly encouraged to attend these workshops.

2.2. Focus Area Descriptions

It is the intention of the TRP to fund proposals in the focus areas described below. Funding of proposals in any focus area is, however, dependent upon the receipt of high quality proposals.

2.2.1 High Density Data Storage Systems

Anis Husain ARPA/MTO
(703) 696-2236, FAX (703) 696-2201
e-mail: ahusain@arpa.mil

Cost-effective high-density digital data storage will enable the rapid growth of storage-intensive systems which are being fueled by the increased use of digital images, video and multimedia programs for both military and industrial/commercial applications. The goal of this topic is to develop and demonstrate prototype high-density, rewritable data storage systems technology (including media, heads, and drive) and critical manufacturing technology that has the potential to radically alter the way information is stored and retrieved in future military and commercial data storage systems. To achieve the goals of this project, vertically integrated teams are strongly suggested.

Proposals will be requested in the following candidate areas. Funding of proposals in any of these candidate areas is dependent upon the receipt of high quality proposals.

Short Wavelength Optical Storage Drive/Media: The goal is to develop and demonstrate a high density 10-20 Gbyte (in 5.25" disc) rewritable optical storage system, including the drive head and mass-producible low-cost plastic media using green/blue lasers. The technology developed should be readily capable of use in future portable systems.

Magnetic: The goal is to develop a 1-2 inch, single disk, high density (1-2 Gbyte), magnetic disk drive technology for portable information systems. The drive could be fixed, removable or mounted on a PCMCIA ("Personal Computer Memory Card International Association") card and should have standard interfaces to portable computers.

Optical Tape: The goal of this effort is to develop data storage capacities on the order of 1 Tbyte per cubic inch with transfer rates in excess of 100 Mbytes per second. The program shall focus on low-cost high resolution media, write/read modules, software/algorithms for file management and robust tape transport systems.

Workshop: Date: May 6, 1994
Time: 9:00 a.m. to 12 noon
Location: Westpark Rosslyn
1900 N Fort Myer Dr.
Arlington, VA 22209
Deadline: April 29, 1994

CALL 1-800-DUAL-USE FOR COMPLETE WORKSHOP INFORMATION

2.2.2 Object Technology for Rapid Software Development and Delivery

Craig Wier ARPA/SSTO
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e-mail: cwier@arpa.mil

Emerging object technologies and services promise to radically reduce the amount of new code required to field an application. Instead, new applications will be substantially assembled through the interconnection of application objects, object services, common facilities and an object request broker. The goal is to accelerate this technology's emergence. Proposals are sought which will result in the creation of an object-technology-based design, development, and execution environment based on emerging industry standards. The environment should support a user-centered software life cycle model and multiple programming languages, be portable and interoperable with components and services from other providers in a distributed computing environment, and be potentially extensible to support real-time applications.

Proposals are expected to result in delivery of functional demonstration applications, integrated design, development and run-time environments in the form of standards-based infrastructure, object services, common facilities, and application/tool objects. At intervals to be determined, selected teams will be expected to demonstrate that their applications and infrastructure components can interoperate with one another. A minimum of two multi-participant consortia is sought.

It is anticipated that consortia will include one or more software tool vendors and one or more application developers. Consortia should propose two or more applications in high-payoff, dual-use domains such as—but not restricted to—configuration, scheduling, resource allocation, or planning. Infrastructure and application development are expected to adhere to a user-centered process characterized by rapid system building, frequent incremental deliveries, an aggressive schedule and strong team empowerment (including end-users and developers). Metrics for success include demonstrations of interoperability, performance, cost to develop, utility (user's perspective, includes application developers and users), evolvability (ease of changing functionality, or add features), and timeliness (speed of functionality delivery).

Workshop: Date: April 21, 1994
Time: 8:00 a.m. - 4:00 p.m.
Location: Dulles Marriott
Washington Dulles Airport
Deadline: April 18, 1994

CALL 1-800-DUAL-USE FOR COMPLETE WORKSHOP INFORMATION

2.2.3 Interoperability Testbeds for the National Information Infrastructure (NII)

Michael St.Johns, ARPA/CSTO
(703) 696-2271, FAX (703) 696-2202
e-mail: trp-nii-testbeds@arpa.mil

TRP is seeking to encourage the creation and demonstration of service and communications interoperability within an NII context through the use of testbed activities. TRP understands that concepts and views of what the NII is, or will be, vary widely. Via this focus area, TRP wishes to

encourage convergence towards and emergence of a common vision of NII interoperability resulting in the creation of common, interoperable service and technology interfaces which in turn define the extent of the NII. TRP expects to fund proposals on a cost-shared basis that establish shared testbeds for NII product interoperability testing with the goal of developing reference architectures and standards of interoperability among the testbed products and between the products and the NII.

Proposals of interest include those for testbeds that address and demonstrate interoperability: (1) across specific technologies (e.g., alternative schemes for encoding or transporting digital video over various media or integration of differing wireless communications schemes); (2) across specific information service functional areas (e.g., integration of alternative forms of electronic publishing or electronic commerce possibly through the development of building blocks for applications and for data and process management); or (3) across an application sector (e.g., interoperation and information exchange between hospital and clinic infrastructures or between centralized schools and "distance learning" sites).

Proposals must also address the broader cross-technology interoperability issues driven by the NII concept. Proposals that do not will not be selected for funding.

Proposals should not duplicate consortia already in existence (e.g., the ATM Forum) but may incorporate existing consortia or consortia members while encouraging broader areas of interoperability where appropriate. Existing testbeds, facilities and demonstration projects may be used as enablers of quick-start demonstrations.

All proposers funded under this program are expected to cooperate with respect to defining and adopting applicable and common interfaces to the NII. TRP will facilitate this by holding post-award cross-consortia workshops.

WORKSHOP:	Date:	April 22, 1994
	Time:	8:30 a.m. - 12 noon
	Location:	McLean Hilton at Tysons Corner 7920 Jones Branch Drive McLean, VA 22102
	Deadline:	April 18, 1994, 4:00 p.m.

CALL 1-800-DUAL-USE FOR COMPLETE WORKSHOP INFORMATION

2.2.4 High Definition Systems Manufacturing

Mark Hartney ARPA/ESTO
(703) 696-2347, FAX (703) 696-2203
e-mail: trp-hds@sysplan.com

Proposals for the development of advanced high definition display product and process technologies will be solicited from consortia or industrial partnerships committed to increasing U.S. manufacturing capacity for high definition displays. Particular emphasis will be placed on (1) low cost, flexible manufacturing processes, and (2) development and demonstration of new dual use product concepts which incorporate added functionality on the display. Partnerships formed between display manufacturers and display users are particularly encouraged. Consortia for process development should also involve suppliers and have a clear path to disseminate and insert new processes into manufacturing facilities. In accordance with TRP policies, no TRP funding will be provided for the construction of facilities or purchase of capital equipment. However, participant investment may result in facilities or equipment whose use, suitably valued, may be considered a part of participants' cost share.

Workshop: Date: May 6, 1994
Time: 10:00 a.m. - 3:00 p.m.
Location: System Planning Corporation
1500 Wilson Blvd.
Arlington, VA 22209
Deadline: April 26, 1994
CALL 1-800-DUAL-USE FOR COMPLETE WORKSHOP INFORMATION

2.2.5 Low Cost Electronic Packaging

Nicholas J. Naclerio ARPA/ESTO
(703) 696-2216, FAX (703) 696-2203
e-mail: nnaclerio@arpa.mil

Electronic packaging is a critical element of a competitive electronics industry. For high-end systems such as super computers and mainframes, packaging is a primary determinant of system performance. For compact, portable electronics, it is a primary determinant of size and weight. For almost all electronic systems, it is the primary determinant of reliability. Ongoing ARPA programs have advanced the state-of-the-art in these technologies, especially in the areas of performance, density, and availability, and have accelerated the insertion of the technology into leading-edge applications such as high performance computing and telecommunications. While these applications are of critical importance to the Department of Defense and the nation, they represent less than a third of the total electronics market. Many higher volume applications require only moderate electrical performance and wiring density, but demand the absolute lowest cost solutions. For these products, such as personal information systems, vehicle engine controls, and hand-held electronics, new technologies must offer cost reduction as well as increased performance in order to provide a competitive advantage. The primary drivers in these markets will be size, weight, and cost reduction, while providing a high degree of reliability and good performance and wiring density. For many applications it will also be important to integrate analog and digital components and simplify assembly. Conventional approaches to system design and partitioning may have to be optimized to take advantage of new packaging alternatives. The purpose of this program will be to form teams capable of developing, demonstrating, and inserting low cost packaging technologies which provide a competitive advantage in the application areas mentioned. Proposals should include at least one military and one commercial application driver, although these can be the same product.

WORKSHOP: Date: April 14, 1994
Time: 6:00 p.m.
Location: International Conference and Exhibition on Multichip Modules
Majestic Ballroom
Radisson Hotel
1550 Court Place
Denver, Colorado
REGISTRATION NOT REQUIRED
CALL 1-800-DUAL-USE FOR COMPLETE WORKSHOP INFORMATION

2.2.6 Uncooled Infrared Sensors

Raymond Balcerak ARPA/MTO
(703) 696-2277, FAX (703) 696-2201
e-mail: rbalcerak@arpa.mil

The need for low-cost night vision technology is a high priority for both military systems and commercial security and safety applications. The capability to see at night, especially in adverse conditions, provides these systems with a distinct performance advantage. The cost of night vision technology, however, has been an impediment to widespread usage. With the advent of uncooled

infrared sensors, there is an opportunity to overcome this barrier and achieve a truly low-cost night vision sensor, affordable to a wide range of users. Reduction of the manufacturing cost of the uncooled infrared sensors is the major focus of this program. Areas to be addressed may include, but are not limited to, the infrared detector, electronics (detector read-out and video processing), and infrared optics. The detector cost shall be addressed through reduction in the number of processing steps and optimization of techniques required to produce the array. The focus is on standard microelectronics processing, such as used for silicon, and utilization of standard manufacturing tools wherever possible. At the same time, the resolution and sensitivity of the array can be increased through improvements in the thermal properties of the sensing material and design and process improvements to thermally isolate the detector elements. Electronics required to drive the detector chip and condition information for subsequent processing shall be designed in modular, programmable families applicable to several array configurations and system applications. Low cost infrared and visible optical elements are required to complete the sensor package. The optics can be addressed through new optical materials, design innovations, and manufacturing processes. Applications that require integrated displays should utilize advanced display technologies that require low power and provide optimum performance. The performance of the uncooled infrared sensors shall be verified through laboratory measurements, and system prototype demonstrations appropriate for the application. The primary applications involve low cost uncooled infrared sensors for military, law enforcement, motor vehicles, and safety and security systems. Other areas of interest are manufacturing process control, environmental control, and medical.

WORKSHOP:	Date:	May 5, 1994
	Time:	9:00 a.m. - 5:00 p.m.
	Location:	Systems Planning Corporation (SPC) 1500 Wilson Boulevard Arlington, VA.
	Deadline:	April 29, 1994

CALL 1-800-DUAL-USE FOR COMPLETE WORKSHOP INFORMATION

2.2.7 Environmental Sensors

Dr. Lawrence H. Dubois ARPA/DSO
(703) 696-2283, FAX (703) 696-2201
e-mail: ldubois@arpa.mil

New field-deployable sensor technologies and real-time data processing/storage/transmission systems are needed to detect and monitor a variety of environmental conditions. The output of such sensor systems could be used for battlefield monitoring, for rapid, high-resolution mapping of contaminants, or for immediate feedback to control industrial processes, waste treatment, and/or remediation efforts. The development and effective use of new environmental monitoring systems can also provide the data necessary for more accurate policy and investment decisions as well as contribute to pollution prevention by enabling the timely detection of new problems.

For the purposes of this competition, only two broad classes of environmental sensor systems will be considered: (1) non-invasive (or minimally invasive) sensors for the in situ characterization of organic compounds, heavy metals, and inorganic anions in soil, ground water, or surface water with chemical specificity; and (2) remote sensors capable of detecting chemical or biological weapons (and/or their precursors) for counter-/non-proliferation, hidden explosives, and contraband drugs. Sensing technologies might include: acoustic, electro-magnetic, electro-optical/infrared, electrochemical, and biological. Proposers should take a systems approach to environmental monitoring including the following considerations: (1) method of deployment, (2) potential for remote operation, (3) automatic sampling, (4) detection with sufficient sensitivity to measure contaminants at or below current regulatory limits, (5) real-time data analysis, processing, and storage, and (6) transmission to a central receiving point. Sensors, and associated

instrumentation, must be compact, low-power, cost-competitive, and not affected by adverse environmental conditions (e.g., vibration, moisture, dust, and interferences).

WORKSHOP:
Date: April 29, 1994
Time: 9:00 a.m.
Location: System Planning Corporation (SPC)
1500 Wilson Blvd.
Arlington, VA 22209
Deadline: April 22, 1994

CALL 1-800-DUAL-USE FOR COMPLETE WORKSHOP INFORMATION

2.3. Statutory Programs for Technology Development

The planned competition will seek to award funds appropriated for Fiscal Year 1994 under three statutory programs for Technology Development: Defense Dual-Use Critical Technology Partnerships (10 U.S.C. § 2511),[2] Commercial-Military Integration Partnerships (10 U.S.C. § 2512),[3] and Defense Advanced Manufacturing Technology Partnerships (10 U.S.C. § 2522).[4]

The following table provides an estimate of the funding available for each of the three Programs:

Statutory Program	Estimated Funding ($millions)
Defense Dual-Use Critical Technology Partnerships	47.0
Commercial-Military Integration Partnerships	74.0
Defense Advanced Manufacturing Technology Partnerships	28.0

2.4. Cost Sharing Requirements

Statutory requirements for cost sharing differ among the three Technology Development Programs. "Commercial-Military Integration Partnerships" requires at least 50 percent non-Department of Defense funding in the first year, 60 percent in the second year, and 70 percent in the third and later years. "Defense Dual-Use Critical Technology Partnerships" and "Defense Advanced Manufacturing Technology Partnerships" each require at least 50 percent non-Federal funding in each year. The types of cost sharing that may be permitted are discussed in Appendix A.

Use of SBIR and STTR funds as non-Federal match is now permitted by TRP Program statutes, but only under certain circumstances. In order to qualify, the work to be done under the SBIR or STTR program must contribute centrally and directly to the proposed TRP effort. Proposals with SBIR or STTR efforts which fail to make this clear case for relevance will suffer in the evaluation of technical plan.

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2 Defense Dual-Use Critical Technology Partnerships support the research and the development of critical technologies that both meet defense needs and have commercial potential.

3 Commercial-Military Integration Partnerships seeks to develop and mature dual-use technologies with clear commercial viability and potential military applications. Note, this Program has a more restrictive cost-share requirement as described in Section 2.4.

4 The Defense Advanced Manufacturing Technology Partnerships Program's purpose is to encourage research and development of advanced manufacturing technologies with the potential for a broad range of military and dual-use applications.

SBIR and STTR funds expended after the date on which proposals are due, even prior to announcement of awards, will be eligible for match in event that the proposal is selected by TRP.

2.5. Developing Your Proposal

Each proposal must specify only one of the seven Technology Focus Areas and select only one of the three statutory Programs as its funding source. For the purposes of the Focused Solicitation, proposals will be rejected as outside the scope of the competition unless they clearly demonstrate that they fall within a Technology Focus Area.

Step 1: Determine Your Technology Focus Area

Assure yourself that the technology you propose falls clearly within the parameters of one of the seven technology focus areas listed above.

Step 2: Determine Your Statutory Program

After you have determined the Technology Focus Area for your proposal, determine which statutory Program is most appropriate to meet your proposal's goals and its funding characteristics. Remember that each Program has corresponding statutory requirements for cost-share which a proposal must satisfy. Each proposal may only be submitted to one Program. However, the TRP reserves the right to fund the proposal from any Program for which it may qualify.

Step 3: Government Interaction and Team Formation

The Government intends to be active in assisting with the formation of proposal teams prior to the date on which a solicitation is published (expected to be May 20, 1994). Until then, interaction by potential proposers and the Federal agencies of the TRP—the Department of Defense (DoD), Department of Commerce (DOC), Department of Energy (DOE), Department of Transportation (DOT), National Aeronautics and Space Administration (NASA), and National Science Foundation (NSF)—to investigate possible proposal teaming arrangements and proposal ideas is encouraged. A workshop will be held for each focus area as described above.

2.6. Guidelines for Assembling a Team

Each proposal must include two or more "eligible firms" (see Appendix A). Teams may also include any other participants appropriate to accomplishing the project. Teams should demonstrate a collective "synergy" between partners that will enhance and improve the potential for a technology investment to yield a commercially viable and marketable, militarily-useful, dual-use product or process. For example, teams could include both a commercial and a defense firm.

2.7. Term of Awards

Technology Development proposals should include budgets with a base term of 12 to 24 months with optional additional terms of 12 to 24 months each. The government may fund both base term and options from the present appropriation depending on the content of the proposal, the availability of funds, the fit with other programs, and any other considerations necessary to establish and maintain program coherence and balance. The government may also choose to condition the exercise of options on the availability of future year appropriations or other funding sources.

2.8. Selection Criteria

The selection criteria contained in this section incorporate all statutory selection criteria for the three TRP Programs under which the Technology Development Focused Competition is being held. Each proposal must address these selection criteria, which are grouped into four equally weighted categories: Scientific and Technical Merit, Technical Approach and Management Planning, Pervasive Impact, and Commitment to Productization. A brief elucidation of each criterion and the appropriate approach to that criterion follows the statement of the criterion.

2.8.1 Scientific and Technical Merit

(a) Technical quality and innovation of the proposed activity, including uniqueness with regard to the state-of-the-art and industry practice.

(b) Feasibility of the project consistent with its proposed cost.

Proposals should explain both the current state-of-the-art and show how the proposed effort will advance the technology beyond it or why the proposed effort represents a new industrial process. Proposals should make clear what alternative technologies exist and explain why the proposed technology is superior. Quantitative analysis is best whenever possible. The proposal should discuss the technical feasibility of the proposed effort, addressing, as a minimum, the technical barriers and risks, projected unit cost of the ultimate commercial product or processes, and time-to-market advantages of the proposed technology over alternatives. If similar projects exist that are already publicly funded by the Federal Government, discuss them and indicate why TRP funding will not duplicate existing efforts

2.8.2 Technical Approach and Management Planning

(a) Clarity of technical objectives and quality and coherence of the technical plan.

(b) Quality and appropriateness of the technical staff assigned to carry out the proposed activities.

(c) Adequacy of the proposer's management plan in addressing the need for facilities, equipment, design and manufacturing tools, and other technical, financial, and administrative resources by proposers and participants to accomplish proposed activity objectives.

(d) Adequacy of proposer's plan for ensuring the protection of intellectual property by the participants.

Discuss clearly and specifically, in realistic terms, the technical objectives consistent with the goals of the proposed program. Provide an approach to mitigate those risks identified in the proposal. High risk is acceptable where it is justified by high potential payoffs and where the management plan includes the correct approach to mitigate that risk. Provide the experience and credentials of the technical team assembled to carry out the developments proposed. Explain how the collective experience and expertise embodied on the proposed team will help insure that the technical objectives proposed will be met. Discuss the resources required to conduct the proposed activities, including facilities, equipment, and technical support. Discuss schedule, with appropriate milestones.

Show that there are common interests and direction on the part of all participants that guide the management of the proposed partnership. Discuss proposed lines of responsibility, authority, and communication through which tasks will be managed, and the procedures taken to insure quality control and cost control. Show how the benefits of the partnership will flow to all the participants. Discuss plans for early identification and resolution of problems. Discuss the methods by which intellectual property will be protected and controlled, within and outside the partnership, including foreign access to that intellectual property. Discuss how the proposed project team will interface with both the partnership's structure and with the TRP's program management team.

2.8.3 Commitment to Productization

(a) Evidence that the proposed activity will be commercially sustained within five years, without further Federal funding.

(b) Evidence of effectiveness of the participants in similar kinds of activities, including technology commercialization. In the case of new ventures, previous performance of the participants separately and/or the key staff will be examined.

(c) Adequacy of system-integration and multi-disciplinary planning, including integrated development (concurrent engineering) of appropriate downstream production, manufacturing, quality assurance, cost, and end-use requirements and factors.

(d) Appropriate structure of the activity (vertical integration, horizontal integration, or both) to include participants who possess all of the necessary skills and who offer the appropriate financial involvement for achieving subsequent productization.

Demonstration of commitment requires an identification of: (1) a viable market, and (2) the resources to move the project forward, both within the project funding period and beyond prototype or feasibility demonstration, to successfully reach that market. The proposal should explain the intended markets, both defense and commercial. Why were they chosen? Provide evidence to support projections that sufficient commercial and defense markets will exist to justify the investment. Discuss why your potential customers will favor your proposed product or process technology over planned or existing technological alternatives.

Demonstrate clearly the availability and quality of proposed cost share. Show how the funds and resources applied actually and clearly advance the progress of the proposed effort, paying particular attention to the application of in-kind contributions. Identify sources and level of funding for commercialization or productization of the project technologies after completion of the TRP-funded effort. What resources will be required in the future to ensure successful manufacturing of a product, or implementing of a new process technology, including all considerations of production of commercial and military items? Identify planned distribution channels for the planned dual-use product(s) or process(es).

Provide evidence that the collective experience and expertise of the partnership will lead to the commercialization of the products or processes to be developed under any award. What current products and/or services of the consortium team members demonstrate knowledge of and know-how in the development and commercialization or productization of technology activities proposed?

2.8.4 Pervasive Impact

(a) Compelling benefits to national security (as defined in the broad context of both application to defense capabilities and enhancement of the U.S. industrial base) of the proposed activity.

(b) Elimination or reduction of health, safety, and environmental hazards, especially in the development or improvement of manufacturing processes.

(c) The potential, where appropriate, to be able to apply critical technology research and development supported or conducted by Federal laboratories and institutions of higher education to advance the national security interests of the United States.

Proposals must demonstrate both a defense and a commercial impact. Commercial value alone, no matter how compelling, without a clear demonstration of the value to defense, is not sufficient. Defense relevance could be embodied in the preservation of a critical defense technology or improved affordability or increased defense capability. Impact may also be demonstrated through elimination or reduction of health, safety, and environmental hazards, especially in relation to the development or improvement of manufacturing processes.

Proposers should discuss the long-term, commercial value of the proposed effort, in terms of both market share and the establishment of high quality job opportunities.

2.9. Orals, Interviews, and Site Reviews

During the proposal review and final stages of selection process, proposers may be asked to give oral presentations to members of the selection panel or staff, or travel to Washington or other locations for an interview. The TRP also reserves the right to conduct site reviews.

3. TECHNOLOGY DEPLOYMENT ACTIVITY AREA COMPETITION

3.1. Focus of Technology Deployment Competition: Manufacturing Extension Centers

This Technology Deployment competition targets the funding of additional manufacturing extension centers only. A manufacturing extension center (MEC) is an organization that works directly with smaller manufacturers (fewer than 500 employees) to assist them in using technology to improve their competitiveness or reduce their dependence on defense customers. An MEC helps companies assess their needs, improve business practices, strengthen and provide training for their work force, and adopt appropriate advanced technology and techniques; it helps manufacturers retain or increase jobs and move to more high skill, high wage jobs.

The target population—the customers—of a proposed MEC may be defined by the proposer by geographic region or by an industrial sector. In the case of a regional definition, the proposer should describe the intended service area and balance the scale of the proposal with the number of manufacturers within that area. In the case of a sectoral definition, the proposer should describe how the services will be made available to distant members of the target population. Proposers must know the target population they identify and its needs, and they must demonstrate a firm commitment to serving that target population. Proposers should identify and make use of existing resources, avoiding the creation of duplicate services or clashing delivery approaches. There is already a substantial public investment in programs and organizations established to address the needs of smaller manufactures. Proposers are urged to learn from and build upon the experience of these programs.

3.2. Proposal Participants

Proposers must be non-profit organizations; Federal, State, or local government entities; institutions of higher education; or combinations of such entities. The organizational framework and leadership responsibility must be clearly described in the proposal.

3.3. Cost Sharing Requirements

The proposer must provide for cash or in-kind match from non-Federal sources in an amount at least equal to the TRP funds requested in the proposal. Proposals for TRP funding of $1 million per year or more must have at least half of their required match in cash that is under the control of the project director. Proposals requesting less than $1 million per year of TRP funding can have a larger proportion of in-kind match, provided this match is well-focused and substantially advances the objectives of the proposal.

3.4. Site Visits and Interviews

During the proposal review and selection process, finalist proposers may be asked to host a site visit by members of the selection panel or staff, or travel to Washington or other locations for an interview.

3.5. Amount and Term of Awards

There is $23 million available in this competition for the Manufacturing Extension Program. Proposals should be presented with detailed budgets for one year and optional budgets for two additional years. While the Government may choose to fund more than one year of a proposal, it is expected that funds from this competition will be awarded for one year only. Funding for additional periods of time is subject to the availability of later appropriations or funding from other Government sources

3.6. Management and Reporting

Recipients of awards will be required to provide quarterly and annual technical reports, an annual audit report performed by a commercial Certified Public Accountant, and financial reports to accompany each request for payment. The government agent for management of winning proposals will be the Manufacturing Extension Partnership (NIST), and the performance reporting standards of that organization will be followed.

3.7. Selection Criteria

The following criteria will be applied with equal weight in evaluating proposals.

3.7.1 Target Population

The proposal should clearly define a target population of beneficiary companies, and should clearly describe the needs of this target population. The target population should include a significant number of U.S.-based smaller manufacturers or companies dependent upon defense expenditures, and it should be large enough to justify the proposed expenditure. The approach set forth in the proposal should be reasonable for the needs identified and the defined population.

3.7.2 Defense Conversion, Dual-Use Impacts

The proposal must provide a substantial impact in advancing defense conversion objectives. It should specifically address the needs of defense suppliers and their subtier suppliers. It should increase competitiveness, number of jobs, and quality of jobs.

3.7.3 Delivery Mechanisms

The proposal must set forth a clearly defined, effective mechanism for delivery of services to the target population, with a mechanism that is appropriate for the distribution of firms, culture, and infrastructure of the region. The proposer must demonstrate a commitment to delivery of needed services to the manufacturers in the target population. The proposer must demonstrate a service orientation and commitment to stimulating change and technical growth in the target population.

3.7.4 Technology Sources and Sources of Essential Related Services

The proposal should demonstrate that the proposer has adequate access to the technology, technical information, and essential related services needed to assist the target population. This access may be through a combination of in-house expertise and experience, partnerships with technology and other sources, and linkages to external sources.

3.7.5 Management Experience, Plans, and Organizational Structure

The proposals must set forth plans for proper organization, staffing, staff training, and management of the activity and must demonstrate that the leadership of the activity has a strong, current experience base to assure success. The leadership must be well-defined, focused, and have appropriate authority to assure the success of the program. The proposal must demonstrate that the organization has the capacity to evaluate and learn from experience and make appropriate changes based on this understanding. The organizational structure, governance, leadership authority, and personnel must be such that change is possible.

3.7.6 Funding, Budget and Cost Share

The proposed spending plan must reasonably match the proposer's projected activities. The proposal must contain a reasonable and practical plan for obtaining cost share. Management must have appropriate control over resources included as cost share.

3.7.7 Coordination and Elimination of Duplication

The proposal must minimize the creation of services, tools, and technology sources which duplicate, overlap, or conflict with existing resources. Proposers must demonstrate an understanding of existing organizations and resources within the environment and establish working linkages where appropriate. If there is a comprehensive state plan for technology transfer or extension, the proposer must document that its plan is consistent with the state plan.

3.8. Examples of Manufacturing Extension Centers

(1) Major center in a region of industrial concentration. Proposal to establish HLB service provider submitted by a nonprofit corporation founded to restore manufacturing strength in its region. Total operational budget of HLB is $6 million per year. Matching funds (50 percent of budget) provided entirely in cash, initially from the state and in out years by a combination of state funds and earned revenues. Serves a population of 7,000 small manufacturers within approximately one hour driving time of the location. HLB is affiliated with major universities in the region, with the state program in its state, and with community colleges for contract training. Has no industrial sectoral focus, serving all small manufacturers in the region. Services include software and hardware demonstrations, field agents, assessments of need, links to lenders to help client firms finance technology improvements, teaching factory and shared manufacturing functions, improved access to consultants, assessment of workforce training need, a specific program to help small firms reduce their dependence on defense customers, etc.

(2) Small center in a start-up role associated with a larger organization. Proposal to establish DJR service provider submitted by a state-chartered organization founded by the legislature to increase the number and quality of manufacturing jobs across the state. Total operational budget of DJR initially is $1 million, but the proposer contemplates returning with a future proposal in a subsequent competition for a larger program, once the groundwork has been laid and linkages have been formed. DJR will draw upon technology and management expertise of a large existing manufacturing extension organization, SGW, in a neighboring state and proposes that SGW be funded at $100,000 per year for its services. DJR has existing facilities, organizational structure, and some equipment. DJR proposes $200,000 per year in cash from the state and $300,000 per year in-kind for its 50 percent match. The initial service region is one major city, with 700 firms, and growth plans include the whole state with 4,500 firms.

(3) Freestanding center in an area of local industrial concentration. Proposal to establish MSN service provider submitted by a community college Advanced Technology Center (ATC) located in a pocket of 650 manufacturing firms situated within one hour drive of the campus. The ATC has good physical facilities, computer systems, software, and manufacturing shop floor equipment. They have been successful at it. They could serve their 650 companies with the facilities on hand, but lack the operating funds. Propose federal funding of $500,000 matched by $150,000 in earned income and $350,000 in-kind for facilities and equipment and salaries already paid. MSN will draw heavily on the expertise of the university-based industrial extension program of its state and on significant in-house expertise in selected areas. They need other sources of technology and seek appropriate linkages.

(4) Sector Specific. The research and industry trade organization affiliated with an industrial sector which is broadly spread across the country proposes to address the most significant three major problems facing the industry as identified in the proposal. A successful solution to the problem would involve assistance to individual companies to implement new technology that would provide for rapid product definition, manufacture, and shipment to the customer. The

proposer will furnish 40 percent of the budget in cash from member dues, with 10 percent in-kind for equipment and buildings. The proposal runs three years and asks for $3 million per year of federal support. The nature of the industry and the approach of the proposer are such that the proposal demonstrates an effective means by which the firms can gain access to the services.

(5) **Satellite to a larger service provider.** A large service provider RHW in one state has been asked to provide services in a neighboring state. RHW submits a proposal to establish a "satellite" operation in a neighboring state. The neighboring state will provide 50 percent match for the funds spent in its state. RHW uses 10 percent of the budget for management and technology sourcing to the satellite, and the remaining 90 percent is used at the satellite for direct service. A satellite with an annual budget of $600,000 is proposed. Linkages with other sources of technology make use of RHW's links.

3.9. Where to Get Additional Information

Prior to the publication of a solicitation, TRP intends to be quite active in providing information and assistance to potential proposers. After publication of the solicitation, communications must be limited to clarification of the solicitation by specifically identified government personnel.

A workshop will be held on April 25, 1994, from 9:00 a.m. to 4:00 p.m. in Lecture Room B of the main administration building of the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland. The morning session will consist of presentations on TRP, the Deployment Activity Areas, and the Manufacturing Extension Centers activity area. In the afternoon, personnel will be available to discuss specific or regional proposal approaches in detail. Please register by faxing your name, organization, phone, address, fax and e-mail to 301-963-6556. If possible, please limit the number of attendees from any single organization to three. If you need further information, call 301-975-5020.

On April 27 from 9:00 a.m. to 3:00 p.m. there will be an informational briefing at the Salt Lake City Hilton—Airport (801-539-1515), 5151 Wiley Post Way, Salt Lake City, Utah, on the Deployment Activity Area of this TRP announcement. All potential proposers from states west of the Mississippi River who desire an information briefing are encouraged to attend this session. The NIST Manufacturing Extension Partnership regional manager for these states will be leading the session. All interested people are asked to fax their name, address, phone, fax, and e-mail address to Joyce Green at (301) 963-6556.

Additional regional workshops may be scheduled. Information will be available from the TRP by calling 1-800-DUAL-USE and from Manufacturing Extension Partnership at (301) 975-5020.

4. PREPARATION FOR THE SUBMISSION OF PROPOSALS

NOTE

The following information is provided for planning purposes only and may be useful in preparing for proposal submission in response to the forthcoming focused solicitation.

4.1. Notice on Evaluators

Employees of the Department of Defense (DoD), Department of Commerce (DOC), Department of Energy (DOE), the Department of Transportation (DOT), the National Aeronautics and Space Administration (NASA), and National Science Foundation (NSF) or other government agencies will evaluate and select proposals jointly. All Government employees are bound by statute (18 U.S.C. § 1905) not to disclose proprietary information. An indication that information is

proprietary should be included where appropriate in top and bottom margins. The Government will not execute individual non-disclosure statements with proposers.

NOTE

Non-government subject matter experts may be used in evaluations. Non-government employees having access to proprietary data will be required to execute a non-disclosure certificate. Any offeror unwilling to allow non-government employees access to its proposal must stipulate GOVERNMENT ONLY ACCESS on the outside of the envelope and on the proposal cover when the proposal is delivered so that the proposal may be handled separately.

4.2. Technical Proposal Format

Technical proposals will be a maximum of thirty-five (35) pages long. The following four sections will be a part of the thirty-five (35) pages:

Section 1— Executive Summary: The Executive Summary will provide a brief (no more than 5 pages) description of the contents of the proposal. It should be written to cogently define your proposal goals, the approach you are taking and the expected result.

Section 2—Body of the Proposal: The body of the proposal will give a detailed explanation of the technical approach, merit and benefits to be derived from the proposed activities, and the management plan. Include a summary of the information on cost contributions from each member of the partnerships.

Section 3—Statement of Work: A Statement of Work will be supplied that discusses the specific tasks to be carried out, including a schedule of significant events and measurable milestones.

Section 4—Selection Criteria Index: An index showing the pages on which each of the selection criteria is addressed will be required.

4.3. COST/FUNDING PROPOSAL FORMAT

Cost/funding proposals will be limited to 50 pages in length, will have no specific page layout requirements and will address funding periods of performance as described in Sections 2.7 (Development) and 3.5 (Deployment). Work Breakdown Structures or certified cost or pricing data are neither required nor desired. Cost/funding proposals will be organized to include the following four sections, in order:

Section 1—Total Project Cost: This section will give a detailed breakdown of costs of the project. See Appendix A for a suggested format. Cost should also be broken down on a task-by-task basis for each task appearing in the Statement of Work. This must include all of the Cost to the Government and Cost Sharing Contributions.

Section 2 —Cost Sharing and In-Kind Contributions: This section will include: (1) the sources of cash and amounts to be used for matching requirements, (2) the specific in-kind contributions proposed, their value in monetary terms, and the methods by which their values were derived, and (3) evidence of the existence of cash or commitments to provide cash in the future. Affirmative statements are required from outside sources of cash.

Section 3—Cost to the Government: This section will specify the total costs to be borne by the Government and any technical or other assistance including equipment, facilities, and personnel of Federal laboratories required to support these activities. The Cost to the Government should be that portion of the proposed effort which is not covered by your cost share.

Section 4—Off-Budget Supporting Resources: This section will show cash or in-kind resources which will support the proposed activity, but which you do not intend to include in the total project cost. Items in this category do not count as cost share nor as Federal funds which must be matched. Examples of items to place in this category include:

(a) Commitments of cash or in-kind resources from other Federal sources, such as national laboratories.

(b) For Technology Deployment: projections of fee-based income where there is substantial uncertainty about the level which will actually be collected, and where the income is not needed to meet cost-share requirements. In-kind services for client companies where the actual usage levels will be determined by company needs, and are therefore uncertain as to level, and where the in- kind resources are not needed to meet cost-share requirements.

An example of a format for presenting cost information is contained in Appendix A.

4.4. Proposal Page Format

The technical and cost proposal page count shall include every page, including pages that contain words, table of contents, executive summary, management information and qualifications, resumes, figures, tables, and pictures. All proposals shall be printed such that pages are single-sided, with no more than fifty-five (55) lines per page. Use 21.6 x 27.9 cm (8 1/2" x 11") paper or A4 metric paper. Use an easy-to-read font of not more than about 5 characters per cm (fixed pitch font of 12 or fewer characters per inch or proportional font of point size 10 or larger). Smaller type may be used in figures and tables, but must be clearly legible. Margins on all sides (top, bottom, left and right) must be at least 2.5 cm. (1").

5. ADDITIONAL INFORMATION

You may obtain information on TRP conferences and workshops as it becomes available by calling 1-800-DUAL-USE. In addition many of our briefings and workshops presentation charts are available through the National Technical Information Service (NTIS). These include the March 1994:

(1) Deployment Activity Area Lessons Learned Workshops

(2) "Technology Reinvestment Project's Conferences on Consortia: The New Way of Doing Business in the 1990's"

The 1-800-DUAL-USE hotline will have information on how you may obtain this information through NTIS.

You can obtain additional information and copies of all TRP documents, all TRP solicitations, and information about outreach activities, by:

- calling 1-800-DUAL-USE (1-800-382-5873) Monday through Friday from 8:00 a.m. to 7:00 p.m., Eastern Time;
- faxing (703) 696-3813, addressed to Technology Reinvestment Project, PA#94-27;
- electronic mailing: Internet address pa94-27@arpa.mil.

Appendix A: Defense Technology Conversion Council Policies

A.1. What is an "Eligible Firm?"

The TRP term, "eligible firm," is defined by statute (10 U.S.C. § 2491(9)). The following working definition paraphrases the statutory language:

> An "eligible firm" is a company or other business entity (or a consortium of such companies) owned or controlled by U.S. citizens that conducts a significant level of its research, development, engineering, and manufacturing activities in the United States. However, a company not owned or controlled by U.S. citizens can be eligible if it is a subsidiary of a parent company that is incorporated in a country whose government funds research and development consortia in which foreign owned subsidiaries can participate. That country must also afford adequate and effective protection for the intellectual property rights of companies incorporated in the United States. A foreign-owned company must still conduct a significant level of its research, development, engineering, and manufacturing activities in the United States in order to be eligible.

A.2. Intellectual Property

(1) Intellectual Property in General

Intellectual property consists chiefly of inventions (whether or not patented), copyrights (in technical data or other matter), trade secrets, and trademarks. TRP treatment of intellectual property rights shall be flexible, with due consideration given to the underlying purposes of the programs, particularly the national security objectives of Section 2501 of Title 10, United States Code. However, the starting point will generally be a regime that allows participants to retain ownership of intellectual property, with rights granted to the Government for Government purposes and with "march-in" rights given to the Government in the event productization goals (in Technology Development) are not advanced in a reasonable time.

(2) Rights in Inventions

(a) The disposition of rights in inventions under contracts, grants, and cooperative agreements[1] (including subcontracts) for the performance of experimental, developmental, or research work funded under the programs shall be governed by Chapter 18 of Title 35, United States Code.[2]

(b) In general, inventions must be disclosed to the Government. Inventors then may elect either to retain ownership of each invention or to relinquish ownership to the Government. The Government retains a royalty-free license to practice retained inventions (or have them practiced by others) on its behalf throughout the world. The Government may also exercise "march-in" rights, taking control of the invention if productization is not achieved in a reasonable period of time. Standard clauses mandated by 37 C.F.R. Part 401 shall generally apply to all TRP grants and cooperative agreements unless either: (1) the party to the agreement is not located in the United States or does not have a place of business in the United States or is subject to the control of a foreign government; or (2) the party to the agreement is not a nonprofit organization or an alternate provision is to be used in accordance with 37 C.F.R. 401.3.

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[1]See the discussion below about the various types of funding instruments.

[2]This chapter, by its terms, applies only to small business firms and education and other nonprofit organizations. However, it is applicable by executive order to other kinds of entities as well.

(c) In the case of agreements that are *not* contracts, grants, or cooperative agreements ("other transactions")[3], disposition of rights in inventions shall be structured through negotiations so as to best serve the national security objectives of Section 2501 of Title 10, United States Code. However, deviations from the scheme used in contracts, grants, and cooperative agreements and described above will have to be justified on a business basis in the specific context of the work to be done in the proposed project.

(3) Other Intellectual Property

Rights in intellectual property other than inventions (such as copyrights and technical data) will be appropriate subject matter for negotiation in TRP agreements. As stated above, TRP treatment of intellectual property issues will be flexible, but will start from a framework including both "Government-purpose" and "march-in" rights unless another formulation can be clearly justified.

A.3. Cost Sharing

A.3.1 Background

TRP statutes require non-Government participants in all TRP projects to provide at least 50 percent of project costs.[4] Cost sharing puts the offeror at risk, making the successful completion of the project in the offeror's best interests.

A.3.2 Cost Sharing General Principles

A general test for constructing your contribution should consider the following:

(a) Is the resource under the control of or used by the consortium (not by an individual consortium member)? If so, does it actually help with the project or, stated another way, is it germane to the overall statement of work?

(b) What is the fair market value of that resource?

(c) Generally, contributions by non-TRP Federal Government activities are neutral with regard to cost sharing requirements, counting neither as Government nor participant contribution.

A.3.3 Quality of Cost Share

Cost share comes in two general categories—cash or in-kind.

(a) Cash contributions as defined below are considered higher quality match because they are easier to value and generally put the offeror at greater risk—i.e., demonstrate greater commitment.

(i) Cash contributions are outlays of funds to support the total project through acquiring material, buying equipment, paying labor (including benefits and direct overhead associated with that labor), and other cash outlays required to perform the statement of work. Government IR&D funds may be used as a source of cash for TRP projects, even though they remain eligible for reimbursement by the Government. Cash can be derived from any source of funds within the participating partners' accounting systems. Cash also can be derived from outside sources, such as donations from state or local governments or funds from venture capitalists.

(ii) A participant's contribution may include revenues from any non-Federal source, including non-Federal contracts or grants. Profit or fee from a Federal contract (other than the TRP project) can also be included. Under certain circumstances, Federal SBIR and STTR funds may also count as cash, as described in Section A.3.5, below.

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[3]These "other transactions" may not be available in all cases because the authority to enter into them has not been given to all the TRP agencies.

[4]The Commercial-Military Integration Partnerships Program has a higher cost sharing requirement—see Section 2.4

(iii) In Technology Deployment (and *not* in Technology Development), only available funds and labor costs associated with personnel dedicated full-time to the project count as cash to meet the cost sharing requirements described in Section 3.3.

(b) In-kind contributions are the reasonable value of equipment, materials, or other property used in the performance of the statement of work. Generally, in-kind contributions are hard to see and value (such as capital asset contribution in terms of space or use of equipment). Even more difficult is the area of intellectual property (technology transfer activities). When proposing intellectual property for in-kind cost share, the offeror should consider the following: Is its use central to the project; is it a real or incidental resource; what is the fair market value of the intellectual property as it is actually used on the project?

(i) Technology transfer activities may be included in a participant's contribution subject to an evaluation of the value of such activities to the Partnership and a limit of their value to no more than the prior investment in the proprietary technology involved.

(ii) The in-kind value of equipment (including software) shall not exceed its fair market value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

(iii) The in-kind value of space (including land or buildings) shall not exceed its fair rental value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

(c) Contributions not allowed as part of cost share include foregone fees and profits on the proposed TRP program; costs previously incurred, i.e., past expenditures in developing technology or intellectual property (but use of previously-developed intellectual property may be a valid contribution if it meets the criteria of in-kind contribution), and cost of work done on past or concurrent government contracts.

A.3.4 Use of Independent Research and Development (IR&D) Funds

A participant's contribution may include independent research and development (IR&D) effort as authorized by FAR 31.205-18(e), which permits IR&D funds to be considered as cost share in certain kinds of cooperative arrangements involving contractors working jointly with one or more non-Federal entities (e.g., joint ventures, limited partnerships, teaming arrangements, and collaboration and consortium arrangements) if the work performed would have been allowed as contractor IR&D had there been no cooperative arrangement.

A.3.5 Use of SBIR/STTR Funds As Cost Match

A small business participant's cost sharing contribution in a TRP project may include funds received under a Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) contract. This can be the case whether the SBIR or STTR was awarded by the TRP or by some other agency. The SBIR or STTR effort must meet two tests if its funding is to be counted as cost share:

(a) the work to be done (under the SBIR or STTR agreement) either:

(i) is clearly identified in the TRP proposal as integral to the proposal effort,

or

(ii) if not identified in the TRP proposal, is clearly related to the work being performed under the TRP agreement and capable of being integrated into that effort,

and

(b) the SBIR or STTR funds to be counted must be expended after the date on which proposals are due to the TRP. Note that funds expended *after the proposal due date but before the commencement of work under the TRP agreement* may be counted as cost share.

Funds expended prior to the TRP proposal due date will *not* be considered part of the non-Government cost share.

It is a statutory requirement prerequisite to the counting of SBIR or STTR funds as cost share that the small business provide "significant equity percentage" in the TRP project. That is, a level of contribution and participation sufficient, when compared to the other non-Federal participants in the partnership or other cooperative arrangement involved, to demonstrate a comparable long-term financial commitment to the product or process development involved in the TRP project.

A.4. Example of Cost Information

The following is an example of the information which should be presented in your proposal. While this example is for "Baseline" costs, proposer should provide information for each phase of the effort.

Proposal Title: _____

Cost for: *Baseline program*

Duration: *XX* months

		---------- Proposers' Cost Share ----------			
5. Element of Cost	1. Total Project Cost	2. (a) Cash	(b) In-Kind	3. Total Proposers' Cost Share (a+b)	4.Funding Requested from TRP (1-3)
i. Labor			*		
ii. Direct Materials			*		
iii. Travel			*		
iv. Other Direct Costs			*		
v. Equipment					
vi. Software					
vii. Patents					
viii. Royalties					
ix. Other Costs					
x. Indirect Costs					
xi. COM or Profit	**	**	**	**	**
TOTALS					
6. Percent Cost Share = Total Proposers' Cost Share (3)/Total Project Cost (1)					

* In-Kind Contributions only apply to estimated fair market value of property owned and used for TRP.

** No cost of money (COM), profit/fee of G&A will be considered on a TRP project at any level.

The following paragraphs are keyed to proposal sample above.

1. Total cost of the TRP Project—all proposed expenditures, whether in the form of cash or in-kind expenses.

2. Total contribution proposed by the consortium—the total contribution is the sum of the individual contributions of the consortium members. The offerors should provide evidence of commitment for each contribution. Contributions may be cash or in-kind.

3. Total Proposers' Cost Share—the total of (a) cash and (b) in-kind contributions by the partnership.

4. Funding requested from TRP—the difference between the Total Project Cost and the Total Proposers' Cost Share. The Government will not support any project where the amount provided by the consortium is less than the funding provided by the Government.

5. Elements of Cost:

i. Labor—Total labor includes direct labor and all indirect expenses associated with labor to be used on the TRP project. Each member of the consortium should provide additional supporting information showing a quarterly phased breakdown of labor and rates for each major category of personnel to be used on the project.

ii. Direct Materials—Total direct material to be acquired and/or consumed in the performance of the TRP project. Each member of the consortium should provide additional supporting information showing only major items of material and how the estimated expense was derived.

iii. Travel—Total proposed travel expenditures relating to the TRP project. Each member of the consortium should provide additional supporting information showing only the number of trips and purpose of each.

iv. Other Direct Costs—Other direct costs that will be necessary for the successful completion of a TRP project. Estimated cash expenditures should be separated from non-cash expenditures. Each member of the consortium should provide additional supporting information showing only: for cash items, only major items of expense and how the expense was projected, and for non-cash items, a description of the item, its purpose to the project and how the fair market value of the item was established and related to the TRP project.

v. Equipment—Prorated value of equipment leased or purchased for dedicated use to the TRP project.

vi. Software—Prorated value of software developed or purchased for use with the TRP project.

vii. Patents—Prorated value of patents of technologies for use with TRP project.

viii. Royalties—Prorated value of royalties associated with technologies used with the TRP project.

ix. Other Costs—Not included above. Offerors should give specific details on these costs.

x. Indirect Costs—Appropirate indirect costs on the elements above. Note: If Independent Research and Development (IR&D) expenditures are being proposed as part of the cost matching expenditures by any member of the consortium, only those indirect costs appropriate in the IR&D pool should be included.

xi. COM or Profit—No cost of money (COM), profit/fee or G&A will be considered on a TRP project at any level.

6. Percent Cost Share - Total Proposers' Cost Share (3)/Total Project Cost (1)

A.5. Historically Black Colleges and Universities (HBCU's), Minority Institutions (MI's), and Small Business

Providing an opportunity for various institutions to forge new relationships and engage in collaboration to their mutual advantage is an important component of the Technology Reinvestment Project. Small Businesses play an important role in the Defense and commercial industrial base. They are specifically the targeted beneficiary class in Technology Deployment and are exclusively eligible to participate in the SBIR portion of the TRP. Under certain circumstances (see A.3.5, above), a small business may use funds received under SBIR or STTR contracts as cost share.

HBCU's and MI's are encouraged to participate in all Programs. In cases where the evaluation of proposals is substantially equal, preference for award will be given to those proposals that include HBCU's and MI's as participants over those that do not include HBCU's and MI's.

Small business concerns owned and controlled by socially and economically disadvantaged individuals (SDB's), as well as small business concerns owned and controlled by women, are encouraged to participate in all Programs. In Technology Development, in cases where the evaluation of proposals is substantially equal, preference for award will be given to those proposals that include SDB's as participants over those that do not include SDB's.

A.6. Types of Funding Instruments

A wide variety of contractual vehicles (contracts, grants, cooperative agreements, and other transactions) is needed to provide the flexibility that is needed in the R&D environment. In the science and technology arena, the objectives to be met often cannot be described precisely in advance. It may be difficult to judge the level of effort required or the likelihood of success. Extensive involvement of government personnel may be required, and the sharing of costs or resources may be desirable. Flexibility in the allocation of rights to intellectual property (patents, trademarks, copyrights, trade secrets) may be necessary to induce participation, particularly by the for-profit sector.

Contracts—more precisely, "procurement contracts"—are used only when the primary purpose is to acquire supplies and services for the direct benefit of the Federal Government, not to advance the state-of-the-art, improve the technology base, or demonstrate the feasibility of a new technology. It is anticipated that no procurement contracts will be used for TRP projects except under vary particular circumstances.

Grants and 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 activities for some public purpose. Government funding is more in the nature of an investment in such situations than a purchase. A grant is appropriate when the degree of involvement of the government agency is not expected to be substantial; substantial government involvement calls for a cooperative agreement instead. In both cases, the procurement contract regulations generally do not apply, so there is flexibility about such things as, for example, intellectual property rights. It is anticipated that most of the awards made under the TRP Focused Competition will result in cooperative agreements between the participants and one of the TRP agencies.

"Other transactions" are just that—any form of transaction that is not a grant, contract or cooperative agreement. These may include (but are certainly 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, and it is anticipated that those TRP awards that cannot be implemented through cooperative agreements will result in "other transactions."

Appendix B: Commerce Business Daily Program Announcement

SPECIAL NOTICE—DEFENSE TECHNOLOGY CONVERSION, REINVESTMENT, AND ASSISTANCE

PROGRAM ANNOUNCEMENT #PA94-27.

DATE: 040894

1-800-DUAL-USE, (8:00 AM through 7:00 PM, EDST, Monday-Friday)

PROGRAM ANNOUNCEMENT (#PA94-27): DEFENSE TECHNOLOGY CONVERSION, REINVESTMENT, AND TRANSITION ASSISTANCE

THIS IS A PROGRAM ANNOUNCEMENT — NOT A SOLICITATION FOR PROPOSALS.

The Technology Reinvestment Project (TRP) is a six-agency, dual-use technology investment effort that includes the Departments of Defense, Commerce, Energy, and Transportation, the National Science Foundation, and the National Aeronautics and Space Administration. It was formed to execute eight statutory programs enacted by Congress in the Defense Technology Conversion, Reinvestment, and Transition Act of 1992. These eight programs have common requirements, including participation by "partnerships," cost sharing between those partnerships and the Federal Government, and a focus on assisting small businesses and defense-dependent businesses. It is the continuing mission of the TRP to stimulate the transition to a growing, integrated, national industrial capability which provides the most advanced, affordable, military systems and the most competitive commercial products. TRP programs are structured to expand employment opportunities in dual-use United States industries and demonstrably enhance U.S. competitiveness. The TRP fulfills its mission through the application of defense and commercial resources to develop dual-use technologies, to deploy manufacturing and technology assistance to small firms, and to establish education and training programs that enhance U.S. manufacturing skills and target displaced defense industry workers.

PLANNED FY1994 SOLICITATIONS:

The TRP plans to conduct two competitions in Fiscal Year 1994. The first, referred to as the "Focused Solicitation," will seek Technology Development proposals only for a very specific set of dual-use Technology Focus Areas and Technology Deployment proposals for Manufacturing Extension Centers exclusively. This competition is the subject of this announcement.

TECHNOLOGY DEVELOPMENT FOCUS AREAS

PROPOSALS WILL BE SOLICITED (AND ACCEPTED) IN THE FOLLOWING DUAL-USE TECHNOLOGY FOCUS AREAS ONLY. PROPOSALS OUTSIDE THESE AREAS WILL NOT BE EVALUATED.

1. HIGH DENSITY DATA STORAGE SYSTEMS: This focus area will include high density rewritable optical storage technology (10-20 gigabytes on a 5.25" (13.33 cm) disc), magnetic storage technology (1-2 gigabytes on a 1"-2" (2.5 -5 cm) magnetic disc), or optical tape technology (1 Terabit per 1 cubic inch (2.54 cm) of tape) technologies (1 Gbit per second transfer rate).

2. OBJECT TECHNOLOGY FOR RAPID SOFTWARE DEVELOPMENT AND DELIVERY: This focus area will seek proposals for object-technology-based design, development, and execution environments based on emerging industry standards.

3. INTEROPERABILITY TESTBEDS FOR THE NATIONAL INFORMATION INFRASTRUCTURE (NII): Proposals appropriate to this focus area will include those that address interoperability across a specific technology (e.g., alternate schemes for encoding or transporting digital video, integrating alternative wireless communications schemes), across a specific service (e.g., integration of alternative forms of electronic publishing or electronic commerce), or across a service sector (e.g., interoperation and information exchange between hospital and clinic infrastructures or between centralized schools and "distance learning" sites). Proposals must also address the broader cross-technology issues driven by the NII concept.

4. HIGH DEFINITION SYSTEMS MANUFACTURING: Proposals will be solicited to develop manufacturing process technology, in conjunction with increased capacity, for high

definition display production. Particular emphasis on lower cost, flexible scale manufacturing processes will be sought.

5. LOW COST ELECTRONIC PACKAGING: The purpose of this program will be to develop, demonstrate, and insert low cost packaging technologies which provide a competitive advantage in the application areas such as personal information systems, vehicle engine controls, and hand-held electronics.

6. UNCOOLED INFRARED SENSORS: The advent of uncooled infrared sensors has created an opportunity to achieve a truly low-cost night vision sensor, affordable to a wide range of users. The reduction of the manufacturing cost of the uncooled infrared sensors will be the major focus of this technology area.

7. ENVIRONMENTAL SENSORS: Proposals will be sought for new field-deployable sensor technologies and real-time data processing systems to detect and monitor environmental conditions for such uses as battlefield monitoring, high-resolution mapping of contaminants, or immediate feedback to control industrial processes, waste treatment, and remediation efforts.

TECHNOLOGY DEPLOYMENT ACTIVITY DESCRIPTION

PROPOSALS WILL BE SOLICITED (AND ACCEPTED) FOR MANUFACTURING EXTENSION CENTERS ONLY. PROPOSALS OUTSIDE THIS AREA WILL NOT BE EVALUATED.

A Manufacturing Extension Center is an organization that works directly with small- and medium-sized manufacturers (fewer than 500 employees) to assist them in using technology to improve their competitiveness or reduce their dependence on Defense customers. A Manufacturing Extension Center helps companies assess their needs, improve business practices, strengthen and provide training for their work force, and adopt appropriate advanced technology; it helps manufacturers retain or increase jobs and move to more high-skill, high-wage jobs.

PROJECTED SCHEDULE FOR THIS COMPETITION

(THE FOLLOWING SCHEDULE IS PLANNED BUT SUBJECT TO CHANGE): (Includes Technology Development and Technology Deployment)

- o April 8 1994: This Announcement published in Commerce Business Daily.
- o April 8, 1994, through May 19, 1994: Outreach activities.
- o May 20, 1994, Solicitation published in Commerce Business Daily.
- o June 30, 1994, PLANNED DEADLINE for receipt of proposals.
- o Announcement of proposals selected for negotiation is expected before the end of the last quarter of Fiscal Year 1994.

OUTREACH ACTIVITIES

Workshops will be held for each of the Technology Development Focus Areas and for the Technology Deployment Manufacturing Extension Centers. Information on time and location of these workshops may be obtained by calling 1-800-DUAL-USE and will be published in the PROGRAM INFORMATION PACKAGE available as described below. IT IS STRONGLY RECOMMENDED THAT PROPOSERS IN TECHNOLOGY DEVELOPMENT ATTEND THE WORKSHOP FOR THEIR RELEVANT FOCUS AREA.

WHERE TO GET ADDITIONAL INFORMATION

A PROGRAM INFORMATION PACKAGE containing additional information about the Focused Development and Focused Deployment competitions will be mailed in mid-April to all names on the TRP mailing list, which includes all organizations who participated in proposals submitted in FY1993 and all those who called 1-800-DUAL-USE and provided their name and address. If you have not received the Program Information Package by April 25, 1994, please call 1-800-DUAL-USE to request it. You may also call 1-800-DUAL-USE to verify that TRP has your name and address or to add them to the list. You can obtain additional information and copies of all TRP documents, including this announcement, all TRP solicitations, and other outreach activities referred to above, by: calling 1-800-DUAL-USE (1-800-382-5873) Monday through Friday from 8:00 AM to 7:00 PM, Eastern Daylight Savings Time; faxing (703) 461-2372 addressed to Technology Reinvestment Project, PA#94-27 electronic mailing: Internet Address pa94-27@arpa.mil.

The second TRP FY 1994 Solicitation will be much like the FY1993 TRP Solicitation, addressing a broader set of Technology Focus Areas (including "Other") for Technology Development and including Technology Deployment, Manufacturing Education and Training, and Small Business Innovation Research (SBIR). The announcement for this solicitation will be later this year.

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Program Information Package for Technology Reinvestment Project FY95 Competition

TECHNOLOGY REINVESTMENT PROJECT

Fall 1994

FOR INFORMATION AND PLANNING PURPOSES ONLY: NOT A SOLICITATION

Program Information Package

for

Technology Reinvestment Project

FY 95 Competition

Fall 1994

**FOR INFORMATION AND PLANNING PURPOSES ONLY:
NOT A SOLICITATION**

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PREFACE

This Program Information Package introduces the third open competition of the Technology Reinvestment Project. In most respects, this competition is similar to both previous offerings, with the prominent addition of new features which are designed to attract small- and medium-sized business.

The basic principles that characterize the TRP remain the same: open competition based solely on merit, Government as partner instead of customer, cost sharing between the Government and non-government partners to cement commitment, and explicit dependence on the concept of dual-use. Recent experience shows that the last of these deserves special attention.

The world of today is very different from the world of five years ago. What has not changed is the dependence of our military strategy on new technologies that provide greater capability over our adversaries. It is crucial that our access to these technologies be not only timely but also dependable and unaffected by international stresses.

Independently, our commercial strategy is becoming the same—produce the best technologies, get them into products ahead of our competitors, manufacture with the highest quality, and deliver at the lowest price. Here, there is significant potential for a leveraged approach. Where it is in the interests of *both* the defense and commercial communities to develop a new product technology, or refine a new manufacturing process, or to embrace a new standard, then there is every reason to work together. That is the essence of "dual-use."

The dual-use concept is widely misunderstood both inside and outside the government. It is neither a ploy for spending defense dollars to further industrial policy, nor is it a ruse to maintain support for the cold war defense industrial complex. It is a strategy for moving towards affordability in defense by partnering with U.S. defense and commercial industry in ways that deliver mutual benefit.

The TRP is a program to build on the dual-use idea by searching for activities that satisfy *both* defense and commercial requirements. Industrial proposers generally understand well what their own benefit will be in a particular TRP deal. The greatest fraction of TRP proposals fail in the display of Defense benefit.

There are a number of way in which this case can be made. The most straightforward example of dual-use is development of new technologies that are applicable to both defense and commercial products. There are many examples. Advanced structural composite materials for aircraft, optoelectronics for advanced computers, and very high density electronic packaging technologies are all obvious examples.

Of course, the trick from the Defense point of view is to have a sufficient sense of commercial markets and commercial products to make informed decisions about what to develop and what to adapt. This is especially true whenever designers incorporate commercial-off-the-shelf (COTS) sub-systems into new weapons systems. Depending on the extent of modification, dual-use may not always be a good approach.

The cost of a specific technology is not always the most critical issue for acquisition. In some cases it is the lack of a commercial application that prevents military access to a technology where, for instance, the Defense market is not large enough to sustain even a small number of suppliers. In some cases, the very availability of a vital Defense technology depends upon finding a commercial application.

For some other important technologies no sustaining commercial market is likely to emerge. The dual-use challenge is, then, to preserve certain critical industrial capabilities by finding and developing commercial products that utilize the existing manufacturing assets in a way that will allow the military product to be produced when demand resumes.

What is required of the Defense dual-use investor is the ability to identify those technologies that will be *both* enabling to defense missions and potentially viable for commercial products. Thus, successful dual-use projects are invariably *industry led* and lead to specific products or processes. This is not to demean the significant roles that are be played by universities, national and Defense laboratories, and not-for-profit research organizations. These organizations are critically important as generators of dual-use technologies. However, if a dual-use project does not directly contribute to the affordable production and acquisition of Defense products, it cannot fairly be described as dual-use.

The eventual benefit to Defense must be clear and routinely reexamined. The fundamental motivation for a TRP project is its potential benefit to Defense. Benefit to commercial industry is desired because of a potential leverage. Where a project is initiated as a chiefly commercial venture with only a general, non-specific Defense purpose in mind, accountability to military value will be difficult if not impossible. Even a project initiated with a proper balance in military and commercial promise can evolve in unanticipated directions away from dual-use. Thus, dual-use activities require continuous scrutiny and review, even more so than conventional government programs.

In summary, we see the role of the TRP is the initial agent for change in developing a dual-use industrial base. Ultimately the Defense interest in the TRP is rooted in our broader objectives for national security. We cannot succeed alone. We believe that we share many common interests and have made collaboration and partnership our lodestar. We hope you will come and be part of our future.

1. GENERAL INTRODUCTION

The following is a general introduction to the Technology Reinvestment Project (TRP). It contains useful background information which may assist proposers in understanding the mission and aims of the projects which the Government wishes to co-fund.

1.1 Mission And Approach

The mission of the Technology Reinvestment Project (TRP) is to stimulate the transition to a growing, integrated, national industrial capability that provides the most advanced, affordable, military systems and the most competitive commercial products. The TRP encourages and pursues its goal of industrial base integration through competitively selected technology proposals. The unifying theme of all funded activities is that investments in dual-use technology development, deployment, and education will offer significant advantages to the military security of the nation and lead to increased flexibility, affordability, and competitiveness for U.S. firms internationally.

1.2 Oversight

The TRP is implemented through the multi-agency Defense Technology Conversion Council (DTCC), which is chaired by the Advanced Research Projects Agency (ARPA), and whose members are the Department of Defense, Department of the Air Force, Department of the Army, Department of Commerce, Department of Energy, Department of the Navy, Department of Transportation, National Aeronautics and Space Administration, and National Science Foundation.

1.3 DTCC Execution and Management Options

At its discretion, the DTCC may assign one or more member-Agency program managers to oversee, administer, and execute a TRP project as its agent representing the interests of the government. The choice of funding instrument—grant, cooperative agreement, or other transaction—is at the discretion of the DTCC and its member Agencies, and is subject to negotiation with prospective competition awardees. Because funds for the TRP are appropriated to ARPA, that agency retains ultimate responsibility for the execution of TRP activities.

1.4 Common Requirements

Four requirements are common to all TRP efforts.

1.4.1 Defense Relevance

All efforts selected by TRP must provide an improvement (capability, affordability, etc.) necessary to meet DoD requirements. In Technology Development, commercial development of a technology without this relevance is not within the scope of TRP. Regional Technology Alliances seeks to foster only those regional industrial capabilities that are important to national security. Manufacturing Education and Training seeks to upgrade the skills of displaced defense industry engineers and improve the capabilities of the U.S. manufacturing base as it pertains to national defense.

1.4.2 Specific Partnership Requirements

For each TRP Technology Development effort, a partnership must be formed which includes at least two "eligible firms" (defined below) and has the breadth of experience and capabilities to carry out the project. Regional Technology Alliances require at least two eligible firms in a region and a sponsoring agency affiliated with state or local government. Manufacturing Education and Training proposals must include an institution of higher education.

1.4.3 Mandated Cost Sharing of At Least Fifty Percent (50 percent) by the Private Sector

Since the benefits to DoD from TRP efforts are only realized in the long-term, it is necessary that proposers show a real commitment to carry the effort through. Sharing the cost also shares the risk, providing an incentive for the proposers' follow-through until completion. (Note that in some instances proposers are required to provide more than 50 percent cost sharing.)

1.4.4 Competitive Selection:

The language authorizing TRP funding requires that all proposals be selected competitively. TRP will make no awards that are not selected through a competition.

1.5 Competition Areas

The TRP is divided into four related Competition Areas: **Technology Development** to promote the development of dual-use technologies; **Regional Technology Alliances** to enhance regional industrial capabilities that are important to national security; **Manufacturing Education and Training** to establish programs for the retraining of Defense workers and improvement of the manufacturing curriculum in U.S. colleges and universities; and **Small Business Innovation Research** to encourage scientific and technical innovation by small businesses. Taken together, TRP's four Competition Areas are intended to encourage improvements in the technology, institutions, and skills needed for a globally competitive, high-technology, dual-use United States industrial base.

1.5.1 Technology Development

Under this Competition Area, the TRP supports applied R&D projects that will lead to new products and processes useful to both commercial and military customers. This kind of technology, product, or process is often referred to as "dual-use." The emphasis here is on research to solve a technical problem that is preventing a dual-use product or process from moving towards the market.

1.5.2 Regional Technology Alliances

The Regional Technology Alliance (RTA) program seeks to enhance regional industrial capabilities that are important to national security. The program recognizes that industries concentrate geographically (e.g., aerospace, electronics) and that these concentrations of industrial capability and expertise are often an important source of technological innovation and competitive advantage.

1.5.3 Manufacturing Education and Training

Under this Activity Area the TRP support projects to retrain displaced defense workers or reform U.S. engineering education to emphasize design and manufacturing.

1.5.4 Small Business Innovation Research (SBIR)

In addition to its three Competition Areas, the TRP also has a Small Business Innovation Research (SBIR) program component. TRP's SBIR program is conducted similarly to other SBIR programs, but it is aimed specifically at furthering TRP's mission and is closely related to the Technology Development Competition Area.

1.6 Government as Your Partner

It is important for awardees to recognize that the results of TRP competitions are joint public-private sector partnerships whose success is dependent upon good faith commitments of

both parties. The goal of these partnerships is to facilitate the ultimate integration of the commercial and military industrial bases through the promotion of dual-use technology activities. For its part, the government is interested in supporting only those projects which demonstrate a military relevance *and also* promise commercial viability or other socially beneficial results.

1.7 TRP Is Not a Procurement

Because it does not enter into buyer-seller relationships or acquire goods or services for the direct benefit of the Federal Government, the TRP is not a procurement. Consequently, the TRP does not fall under the rules, regulations, and procedures of the Federal Acquisition Regulations (FAR) The TRP has a great deal of latitude in how to structure agreements to the benefit of both the government and its private sector partners. As a practical matter the TRP uses cooperative agreements, grants, or "other transactions" as funding instruments instead of procurement contracts.

The TRP does use contracts under the FAR in its SBIR Competition Area.

1.8 How to Use This Program Information Package

This Program Information Package, also called the "PIP," is organized to assist prospective proposers with understanding whether or not this is the right competition for them, and how to go about preparing their proposal(s). To make the most effective possible use of this PIP, please follow these steps:

1. Read this Introduction (Chapter 1) and Chapter 2, "Notices." These two chapters apply to the entire TRP FY 1995 Competition.
2. Review the material that generally describes each of the four TRP Competition Areas—Technology Development, Regional Technology Alliances, Manufacturing Education and Training, and Small Business Innovation Research—that appears in the first few sections of Chapters 3 through 6. This introductory material is in Sections 3.1, 4.1, 5.1, and 6.1 through 6.3.
3. After you have identified the Competition Area this appropriate for you, review its Chapter thoroughly. These four chapters are intended to be self-contained. The only case in which you may need to refer to the chapter for another Competition Area will probably be to review the Technology Focus Areas in Section 3.2 (for Technology Development) if you decide to participate in either Regional Technology Alliances or Small Business Innovation Research.
4. Appendix A contains a list of state points of contact who can provide you with assistance in preparing and submitting your TRP proposal or Concept Paper.

PREVIOUS TRP PROGRAM INFORMATION PACKAGES ISSUED FOR THE FY 1993 COMPETITION AND THE FY 1994 FOCUSED COMPETITION ARE NOT APPLICABLE TO THIS FY 1995 COMPETITION AND ARE EXPRESSLY SUPERSEDED BY THIS PROGRAM INFORMATION PACKAGE.

1.9 Where to Get Help

You may obtain additional information and copies of all TRP documents, all TRP solicitations, and information about outreach activities, by:

- calling 1-800-DUAL-USE (1-800-382-5873) Monday through Friday from 8:00 AM to 6:00 p.m., Eastern Time;
- faxing (703) 696-3813, addressed to Technology Reinvestment Project, PA#95-04;

- e-mailing: Internet address pa95-04@arpa.mil.

You may obtain information and coordination with other companies within your state by contacting the point of contact for your state identified in Appendix A of this PIP.

2. NOTICES TO PROSPECTIVE PROPOSERS

The following notices are provided to alert proposers to specific requirements for the FY 1995 TRP competition.

2.1 Adherence to Program Guidelines

To minimize the potential cost to proposers and maximize potential for success the TRP asks that you carefully consider the following:

1. Cost sharing of at least 50 percent is a requirement of all TRP Programs. Under one TRP statute, Commercial-Military Integration Partnerships, cost sharing of 50 percent in year one, 60 percent in year two, and 70 percent in year three is a requirement.

2. Under certain circumstances detailed in the text of this Information Package, funds received under the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs may be used for cost sharing by small business participants in TRP proposals. This results from changes to TRP Program statutes enacted by Congress.

2.2 Program Coherence

It is the intention of the TRP that awards made under the forthcoming solicitation shall create, to as great a degree as possible, a coherent program of technology reinvestment across Competition Areas, Technology Focus Areas, executing agencies, and otherwise. Accordingly, considerations of program coherence will be applied in the determination of funding of proposals after evaluations have been made based on the selection criteria set forth in this PIP.

2.3 Proprietary Nature of Information and Licenses

Submission of a proposal constitutes the grant of a license to the Government to evaluate the proposal for the purposes of the forthcoming TRP competition and other possible public funding opportunities. You may restrict this license to this competition only by placing **a conspicuous legend** on the TRP Cover Sheet and all pages stating, "For TRP Evaluation Purposes Only"; provided, however, that if an agreement is awarded as a result of evaluation and negotiation, the rights of the Government in the proposal shall thereafter be as specified in that agreement.

Each proposal is expected to contain innovative technical and business ideas that the participants intend to exploit to their competitive advantage in commerce or otherwise. Legends asserting the proprietary nature of a proposal may be used. For purposes of the Freedom of Information Act, the TRP considers that proposals contain commercial or financial information submitted on a privileged basis. The TRP considers each proposal submitted to be a literary work fixed in a tangible medium of expression and, therefore, subject to the author's copyright.

Employees of the Department of Defense , Department of Commerce, Department of Energy, Department of Transportation, National Aeronautics and Space Administration, and National Science Foundation or other government agencies will evaluate and select proposals jointly. All Government employees are bound by statute (18 U.S.C. § 1905) not to disclose proprietary information. An indication that information is proprietary should be included where appropriate in top and bottom margins. The Government will not execute individual non-disclosure statements with proposers.

It is the intention of the TRP to use non-government technical experts to assist with the evaluation of proposals. In such cases non-disclosure and non-compete agreements will be executed with such individuals.

To insure proper handling of "Government Only" materials, all such proposals shall be marked prominently with a label stating: GOVERNMENT ONLY ACCESS

2.4 RELATIONSHIP OF THIS PIP TO THE FORTHCOMING SOLICITATION

This PIP contains a large amount of valuable information that you should refer to as you assemble a proposal in any of the TRP Competition Areas. This information includes examples of projects that can guide you in structuring your own proposal, statutory language, descriptions of Focus Areas, and descriptions of the Competition Areas.

The TRP anticipates that the forthcoming solicitation will explicitly incorporate this PIP by reference, with any clarifications or corrections that may be necessary.

Both the forthcoming solicitation and this PIP are subordinate to the requirements of the TRP statutes. Any perceived discrepancy between a statute and either this PIP or the forthcoming solicitation should be brought to the attention of the TRP for clarification.

Once the planned solicitation is published, this PIP will constitute an informational supplement to that solicitation. Proposers are expressly charged with the responsibility to be fully informed of the contents of this PIP as well as of the forthcoming solicitation.

2.5 Procedures for Protest

Objections of any kind to the forthcoming solicitation may only be made in writing. You must submit them to the TRP at the address given for proposal receipt in the solicitation within ten (10) days after the solicitation is published in the Commerce Business Daily.

Objections or other actions in the nature of protest of any TRP selection, announcement, or award will only be considered if made in writing. These, too, must be submitted to the TRP at the address given in the forthcoming solicitation for proposal receipt within thirty (30) days after the selection, announcement, award, or other action giving rise to the objection.

3. TECHNOLOGY DEVELOPMENT COMPETITION AREA

3.1 Background Information

In the Technology Development competition, TRP seeks projects to create and mature new products and process technologies with potential for both commercial and defense applications. These products or processes should be at a stage of development that makes them likely to be commercially viable from 2 to 5 years after completion of the proposed TRP-funded project. Proposals that involve either basic research or final product development beyond the stage of product prototype or feasibility demonstration are outside the scope of the TRP competition and will not be acceptable.

3.1.1 Necessary Proposal Elements

Proposals in Technology Development must address all of the following considerations in order to meet statutory requirements and to score well on the TRP selection criteria:

- **Strong, Well-Focused Technical Idea:** Proposals must include an idea that represents an important technology at an appropriate stage of development. Proposers should identify a specific set of technical issues that stand in the way of moving these products or processes into the market and address how their proposal will resolve these issues and advance the technology. Technical solutions should be innovative and have a reasonable degree of risk. Open-ended funding for an institution or "Center of Excellence," or other unfocused technology efforts or studies will not be competitive. It is highly desirable that a proposed technical idea fall clearly within one of the twelve defined Focus Areas for the Technology Development Competition Area that are described in Section 3.2, below, although a Focus Area identified as "Other" is available for strong technical ideas that do not fall within one of the defined Focus Areas.
- **Defense Relevance:** Proposals must demonstrate that a clear, direct, and quantitative improvement in Defense capabilities (availability, reliability, performance, etc.) will accrue from the product or processes developed in the project. In general, this advantage will be realized through commercialization of the proposed products or processes.
- **Strong Team:** Every proposal must have at least two eligible firms* on the team. Any other participant that adds strength to the team (universities, Federal laboratories, etc.) may also be included. Proposers should ensure that every team member contributes to the proposed effort. If the project succeeds, the team must be committed and able to bring proposed products to market or use proposed processes without additional Federal Government funding.
- **High Quality Cost Share**: TRP statutes require that the proposal team bear at least 50 percent of project costs. Cost sharing ensures that both the proposers and the Government share in the risk of the effort. Consequently, it is expected that proposers will offer cost share which places them at risk. The most appropriate way to examine cost share is to realize that the TRP is your partner in this effort and ask whether you would accept the cost share you are proposing in lieu of cash from the Government.
- **Realistic Assessment of Market:** Proposals must present a realistic assessment of market opportunities for products or processes to be developed. Proposals must avoid unsupported claims of pervasive impact and market share.

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* "Eligible firm" is defined by statute (10 U.S.C. § 2491(9)). See Section 3.3, below.

3.1.2 Concept Paper Opportunity

Teams interested in the Technology Development Competition Area may submit "Concept Papers" before investing time and effort in the development of a full proposal and receive a formal response. Submitting a Concept Paper is not a requirement, but it is strongly encouraged, particularly in the Focus Area (see Section 3.2) identified as "Other." Complete instructions for submitting a Concept Paper may be found in Section 3.7.

3.1.3 Tentative Schedule

The following is the planned schedule for the Technology Development Competition:

Publication of Announcement in Commerce Business Daily (CBD):	October 21, 1994
Outreach Period:	October 21, 1994 - December 21, 1994
Due Date for Concept Papers:	December 21, 1994
Publication of Solicitation:	February 3, 1995
Due Date for Full Proposals:	March 17, 1995
Publication of Selections:	May 1995
Completion of Negotiations:	September 1995

3.1.4 TRP Outreach Activities

The TRP plans to conduct a variety of outreach activities around the United States up until December 21, 1994. Information about TRP-related meetings, publications, and other outreach activities can be obtained by calling the TRP at 1-800-DUAL-USE.

Each state has identified a point of contact to provide additional coordination and information for companies within the state wishing to participate in TRP. Activities sponsored by a state may include networking opportunities, proposal workshops, or development of a partnering database. Although the TRP staff in Washington coordinates some activities with these representatives, it is important to note that the TRP cannot endorse state policies and selection criteria as part of the TRP process. A list of the state representatives, as provided to the TRP, appears in Appendix A.

3.1.5 TRP Funding Instruments

TRP recognizes that the typical Government procurement contract cannot provide the flexibility that is needed in the R&D environment. In the TRP environment it is often difficult to state the tasks to be performed with great specificity. Extensive involvement of government personnel is often required, and the sharing of costs is required. Flexibility in the allocation of rights to intellectual property (patents, trademarks, copyrights, trade secrets) may be necessary to induce participation, particularly by companies from the for-profit sector who have no prior experience as Government contractors.

Because contracts—more precisely, procurement contracts—are properly used only when the primary purpose is to acquire supplies and services for the direct benefit of the Federal Government, not to advance the state of the art, improve the technology base, demonstrate the feasibility of a new technology, or meet one or another of the objectives of the TRP, it is anticipated that no procurement contracts will be used for TRP programs except as may be required for SBIR projects.

Government-sponsored research efforts typically use grants and cooperative agreements when the purpose of the effort is to transfer something of value to a recipient to support and stimulate R&D for some public purpose. Government funding is more in the nature of an

investment than a purchase in such situations. A grant is appropriate when the degree of involvement of the government agency is not expected to be substantial; substantial government involvement calls for a cooperative agreement instead. In both cases, the usual procurement contract regulations generally do not apply, so there is some flexibility to tailor the agreement to meet the needs of the participants.

"Other transactions" are just that—any form of transaction that is not a grant, contract or cooperative agreement. These may include (but are certainly 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.

Most TRP awards will result in cooperative agreements or other transactions. The contracting authorities and policies of the six TRP agencies are not all the same. Different agencies have different contracting authority under their organic statutes and under the regulations which govern their operations. While this discussion of funding instruments is based on ARPA's authority, it is applicable, for the most part, to the other TRP agencies. All the TRP agencies are committed to being flexible in their contracting practices in order to meet the needs of TRP awardees insofar as possible under their statutes and regulations.

3.1.6 Limitations on Foreign Access to TRP-Funded Technology

The Department of Defense Authorization Act for Fiscal Year 1995 includes a statutory condition on the funding of TRP projects that "the principal economic benefit of, and, to the extent practicable, the job creation resulting from [TRP projects] accrue to the economy of the United States." This philosophy was a cornerstone of TRP policy before its enactment by Congress. In keeping with both philosophy and legislative directive, TRP agreements include a provision requiring the participants to disclose to the Government certain forms of transfers of technology to foreign entities and to obtain permission prior to implementing such transfers. The controls contemplated in this provision are in addition to, and do not change or supersede, the provisions of the International Traffic in Arms Regulation (22 CFR pt. 121 et seq.), the DoD Industrial Security Regulation (DoD 5220.22-R) and the Department of Commerce Export Regulation (15 CFR pt. 770 et seq.)

Transfers governed by this provision include the sale of a company, and sales or licensing of technology. The notice and approval requirement does not apply, however to:

- sales of products or components, or
- licenses of software or documentation related to sales of products or components, or
- transfers to foreign subsidiaries of TRP alliance participants for purposes related to the TRP project, or
- transfers which provide access to technology to a foreign firm or institution which is an approved source of supply or source for the conduct of research in the TRP project provided that such transfer shall be limited to that necessary to allow the firm or institution to perform its approved role in the TRP project.

3.1.7 Historically Black Colleges and Universities and Minority Institutions

Historically Black Colleges and Universities (HBCU's) and Minority Institutions (MI's) are encouraged to participate as team members in the Technology Development Competition Area. In any case in which the evaluation of two or more proposals is substantially equal, preference for award will be given to those proposals which include HBCU's and MI's as participants over those which do not include an HBCU or MI.

3.2 Technology Development Focus Areas

The Technology Development competition described in this section primarily seeks proposals in twelve Technology Focus Areas described in detail below. Read these descriptions carefully to see if your concept fits into one of the Focus Areas. Every proposal must specify that it is directed to one and only one Technology Focus Area.

TRP will consider proposals in other technologies. Proposals not falling into one of the twelve listed Focus Areas should be designated as "Other." Proposals directed to one of the twelve defined Focus Areas, but falling outside its scope as described below, will be considered by TRP to be in the "Other" Focus Area.

If a large number of proposals are submitted to or placed into the "Other" Focus Area, a lower selection rate for this Focus Area can be expected. Proposers to the "Other" Focus Area are strongly encouraged to submit a Concept Paper prior to preparing a full proposal.

3.2.1 Affordable Advanced Controls Technologies

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Under this focus area, participants will develop and demonstrate new, affordable advanced digital electronics and control technologies which can dramatically enhance US product competitiveness. Potential benefits include better product capabilities and more efficient and cost effective manufacturing. New technologies promise improved reliability and the ability to operate at high temperatures, while simultaneously reducing cost, weight, volume, and power consumption. Computer intelligence and precision positioning technologies are just two of the technology areas which can positively affect cost reduction of both defense and commercial products. Fault tolerant architectures, employing such advancements as real-time electronic modules and new control laws to exploit digital technology, will lead to improved reliability and reduced cost of military and commercial electronic control systems. Benefits will also be realized through the application of effective dynamic, adaptive engine controls to reduce commercial aircraft fuel costs by 4.6% (yielding up to $1B per year savings for the Airline Industry). Further, military aircraft can achieve an 18% thrust-to-weight improvement, plus a 9.7% Total Onboard Gross Weight reduction. Other US industries (such as automotive, health care, telecommunications, and power generation and distribution) can also profit from these advances. For example, a higher degree of functionality and integration of electronic control units for multiple components and subsystems can be achieved by the automotive industry. For the manufacturing sector, industrial products and processes, such as plastics processing, textile and packaging machinery, steel rolling mills, and mining equipment will incorporate technologies demonstrated in this effort to lower product prices.

Proposers in this focus area are encouraged to exploit robust, highly adaptable and scalable technologies which can operate in both benign, or adverse high temperature or hazardous environments. Emphasis should be placed on achieving products that are more affordable, reliable and easily maintained. Proposals must address a logically phased development program that proceeds from component development, to subsystem fabrication and test, to prototype demonstration. Demonstration and performance goals for each phase must be clearly identified. Proposals must describe the market potential, as well as strategies to exploit existing and/or planned investments. Specific end item applications must be identified.

3.2.2 Affordable Polymer Matrix Composites For Airframe Structures

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Establishing and maintaining technological leadership in the use of advanced materials and structures for airframe components is essential to continuing and strengthening the competitiveness of the U.S. aerospace industry and to achieving leap-ahead performance improvements in military aircraft. Current use of composite materials in military and commercial transport aircraft in the U.S. has been, for the most part, limited to secondary structures. The true payoff for use of these materials lies in their application to a primary load bearing structure, such as the wing, which accounts for the majority of both aircraft weight and airframe structure cost. Successful application of polymer matrix composites to primary structure will improve aircraft energy efficiency and range, and maintain an industrial base in both materials and structures manufacturing, all of which is critical to DoD needs.

The technical risks associated with the use of composites in primary airframe structure are minimal, but their application has been inhibited by the inability to produce large primary structures at costs competitive with alternative approaches. Under this focus area, participants will develop and validate the materials and manufacturing technologies for the affordable fabrication of primary airframe composite structures, such as a wing for transport aircraft. Areas to be considered include design for manufacturing, assembly, and maintainability. In order to confirm and validate the cost, performance, producibility and reliability benefits resulting from the application of composites, tests should be conducted on representative aircraft structural components and subcomponents subjected to realistic usage environments.

Proposers should consider the full spectrum of both acquisition and life cycle costs in the development of their approach and compare it with alternative approaches and technologies. Proposed programs should also leverage past and existing efforts in order to eliminate costly duplication of effort and to avoid technological pitfalls. Proposals should focus on the technologies required to achieve affordable, cost-effective manufacture of composites for primary structure, support a technology availability/acceptability window approximately five years after program initiation, and define the remaining activities (including required certification and the completion of product development and implementation).

3.2.3 Biological Sensors and Multiorgan Diagnostic Screening

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Proposals will be solicited in only two principal development areas: new technology devices for the biosensing of human physiologic parameters and organ systems diagnosis. These technologies will broadly apply to combat casualty care, wound healing monitoring, civilian trauma, hospital, home care, and diagnostics related to indicators of trauma, early disease, or pathology. Non-invasive sensor technology must be capable of providing remote, wireless communication of data. These sensors must operate with low power consumption, and resist adverse effects of environmental conditions and body motion. Multiple sensor data must be collected with sufficient resolution and sensitivity for diagnostic-quality interpretations, within reproducible statistical normal ranges and limits of detection.

Diagnostic development will also focus on non-invasive multi-organ screening technologies that greatly enhance contemporary capabilities to detect very early disease processes (respiratory, cardiovascular, genitourinary, and central nervous systems), to assess the severity of combat wounds and to monitor wound healing processes. To ensure the best use of the products, an effective and comprehensive commercialization plan is required defining a realistic packaging and marketing capability, as well as a strategy for insuring cost effectiveness. From a military standpoint, this effort will yield affordable approaches to sensing physiological status on the battlefield, or in field hospitals.

3.2.4 Ceramic Material Applications: High Performance Ceramics and CFCCs

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U.S. industry (aerospace, civilian, and defense) can radically improve the system-level performance of diverse end items, such as turbine engines, chemical processing, and vehicular engines through the application of high performance ceramics and continuous fiber ceramic composites (CFCCs) to critical components. Projections indicate that the development of the substantially larger civilian market will drive costs down considerably for aerospace and defense. The military will, thereby, gain lightweight, high performance systems, particularly for aircraft and land vehicles, at affordable costs.

The goal of this activity is to accelerate the introduction of these new materials by linking design, low-cost manufacturing, and prototype/insertion activities. Successful demonstrations of higher performance components at affordable costs will lead to market acceptance and will encourage the application of these materials to still more components. Applications of interest include:

- Hot section components of gas turbine engines for man rated aircraft, missile and drone engines, stationary power generation, and land vehicles;
- Light weight and wear resistant ceramic turbochargers, valve and fuel train components for automotive and diesel engines;
- CFCCs for large volume industrial applications including burners, combustors, waste incinerators, pollution control devices, process heaters and boilers and corrosive material processors, and advanced propulsion systems (for both commercial and military use).

Proposals are sought which will create strategic partnerships among end-users, original equipment manufacturers, and ceramic/CFCC manufacturers, all of whom will support a common manufacturing base. Proposals must include performance-based assessments of components in end-use environments, indicating development targets for the low-cost manufacturing efforts. End users are expected to take the lead on the development of design methodologies and on component test and evaluation tasks. Applications must include at least one of commercial and one of military relevance; these may be coincident. Silicon Nitride and Silicon Carbide compositions are of primary interest for monolithic components.

Successful proposals will deliver multiple components (manufactured by various methods which yield progressively lower costs) for testing and insertion. Metrics for success include the number of components installed, reductions in manufacturing cost, and performance of components in applications.

3.2.5 Cryogenic Coolers for Electronic System Applications

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DoD and NASA have utilized cooled detectors and electronic devices for thermal imaging, guidance packages and power conversion. For the military, the prospect of achieving infrared systems with sensitivities and ranges characteristic of cryogenically cooled systems, at costs, life spans, and dependability approaching the potential of emerging uncooled systems is exciting. Commercial uses for cold electronics extend to areas as diverse as high performance computing, communications and medicine. Performance improvements depend upon enhancing the mobility of carriers in semiconductors. The goal is 2 to 4 times present mobility, with concomitant benefits in system operation. Optoelectronics and magnetoelectronics achieve such enhancements at low temperatures, but the availability of dependable, low-cost refrigerators which can be conveniently integrated within the electronics package limits widespread use of cold electronics.

Proposals should address the development of long-lived cryocoolers, with mean time between failure of the order of 5 to 7 years, and demonstrated manufacturability for low cost. The temperature range of interest is from -50C to -200C, coinciding with known improvements in electronics performance. Thermoelectric refrigeration with high reliability is applicable to some parts of this temperature range, but other cryocoolers must be developed for the lower temperatures. Parameters which must be addressed are wall plug efficiency for cooling, lifetime, and unit cost. Partnerships between cryocooler manufacturers and electronics manufacturers are encouraged, and users must be identified. The final demonstration will compare the performance and cost benefits of a packaged electronics system with those of conventional commercial systems. Contractors must demonstrate that they have a clear technical path toward this goal. These systems should include thermal isolation packaging with electrical/optical coupling, and optimization at the operating temperature.

3.2.6 Digital Wireless Communications and Networking Systems

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Wireless communications is a dynamic technology area, enjoying considerable commercial development at present. Military needs for secure, digital, networked, high data rate systems are well documented. The Army's program to "Digitize the Battlefield" is an excellent example. This focus area specifically seeks to accelerate the development of innovative dual-use communications and networking products, based on configurable, modular digital wireless technologies, for military, law enforcement, and commercial application. Specific needed capabilities include multi-user secure video teleconferencing, bandwidth flexibility (e.g. high data rate video intermixed with lower data rate voice or very low data rate instrumentation traffic, and handset interoperation across frequency bands -- e.g. ISM, cellular, PCS).

Of interest are efforts that develop and utilize advanced component technologies (e.g. conformal antennas, miniaturized filters, and advanced batteries) to produce small form factor modular radios. These should be capable of frequency or waveform agility, or overlaying communications channels on existing spectrum users. Also of interest are products for wireless and wireline network interoperability insuring high quality end-to-end communications across fiber optic, satellite, and radio channels. Networking approaches that support dynamic multi-hop mobile operation are of interest. Communications products are also sought that specifically support mobility on top of emerging multimedia, packet switched networking standards like ATM/SONET and/or TCP/IP. These must address well defined applications that are responsive to both military and commercial needs. The ability to demonstrate compatibility and interoperability with existing communications standards is highly desirable.

3.2.7 Electric and Hybrid Tactical and Commercial Vehicles

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Hybrid electric and electric technologies promise a significant increase in capability for tactical and combat vehicles, as well as trucks and vans used extensively by the commercial and military communities. Hybrid electric drivetrains are smaller, more efficient, and provide layout flexibility. Vehicles employing these drivetrains can reduce fuel consumption by as much as 25%. This would lessen dependence on foreign oil, reduce pollution and enhance US competitiveness in transportation manufacturing. The military will realize increased mobility, available onboard electrical power, stealth capability, improved internal layout, better fuel efficiency (and lower logistical support requirements), and reduced life cycle cost. In order to reach these goals, technology development and efforts to reduce manufacturing costs of drivetrain components (particularly at low production rates) must be fostered.

Existing ARPA and DOE programs are focused on lighter vehicles. In this effort, teams should concentrate on medium or heavy vehicles (gross vehicle weight class - 8,500 to 30,000 and 30,000 to 60,000 pounds). Parallel, series and pure electric drivelines are all of interest, although parallel hybrid systems are favored in heavy weight classes with long endurance requirements, while series hybrids are preferred for both mid and heavy weight classes for shorter-endurance operations. All-electric drivetrains are best for those urban commercial situations where air pollution considerations are a driving factor or in military applications where stealth is a major goal.

Proposers should take a systems approach to increase power density and provide onboard electric power for non-propulsion applications. Component integration should include efficient power generation systems; fully-regenerative high speed-torque envelope propulsion systems; high-operating temperature and voltage power controllers; dense energy storage, and overall intelligent vehicle power management. Systems cost and reliability should be addressed through such methods as system performance modeling, part count reduction, manufacturing efficiency and methods for assuring product commonalty. Each proposal shall include the following:

- Installation of a medium or heavy drivetrain on at least one military and one commercial vehicle to demonstrate acceptable performance, first unit and life cycle cost, high efficiency, low acoustic and thermal signature and low emissions.
- A combination of technology development efforts with the potential to reduce fuel consumption by at least 25%.
- A commercialization plan that addresses the phase in of technology advances in both commercial and military products with the goal to enter production as quickly as practical.
- Technology developments that can be integrated into a cost-effective, producible propulsion system that demonstrates a 50% reduction in overall vehicle emissions per mile in the mid and heavy vehicle weight classes before the year 1998.

3.2.8 Low Cost Specialty Metals Processing

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Unique requirements of robustness, reliability, and low weight drive DoD to depend heavily on special metals (titanium, superalloys, aerospace aluminum alloys, magnesium, and beryllium) for many defense and aerospace applications. The cost of these specialty metals is characteristically high, but can be lowered through commercialization. This means that the special metals industry must lower materials and processing costs sufficiently to develop a strong commercial market for these essential materials. The key to accomplishing this is to encourage commercial industry to develop and demonstrate innovative, low cost production, forming, and fabrication technologies. A number of such innovations have demonstrated the feasibility of a variety of potentially pivotal processing improvements, which, if brought to maturity, will reduce costs sufficiently to satisfy strong non-aeronautics demands. Low cost alloys, near-net shape component fabrication processes, such as precision investment casting which use in-line process sensing, real time process control, and improved process modeling, can be implemented to achieve significant cost reduction.

Successful proposals would result in delivery of multiple components for market insertion of lower cost products. Programs should be vertically integrated with heavy involvement of materials suppliers, components fabricators, and potential users. Metrics for success include the number of components developed for insertion, reductions in manufacturing costs of components, and performance of components in applications. The proposed programs should leverage past and existing concepts and clearly indicate the path to production of commercial products made from advanced specialty metals and alloys.

3.2.9 Millimeter Wave Products for Military and Civilian Applications

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Proposals are sought for the development of millimeter wave frequency (greater than 30GHz) products incorporating monolithic format integrated circuits. The products to be developed must provide, at an affordable cost, reliable performance meeting all electrical, thermal and mechanical requirements within size and weight constraints imposed by the system or systems in which they will be used. Developments and products of particular interest will be of value for both commercial and military applications. Special emphasis should be placed on improvements in the performance and cost effectiveness of sensors and other affected military products. Some important products are (1) affordable collision avoidance systems for vehicles; (2) very compact, high performance, lightweight, millimeter-wave personal communication systems; (3) transmitters for sending medical information from individuals to hospitals and physicians; (4) identification (tagging) systems for vehicles (e.g., automobiles, trucks, railroad cars); and (5) lower cost, smaller cameras for all-weather vision in small aircraft, trucks and automobiles.

In addition to monolithic integrated circuit development and production, efforts may be focused upon the development, manufacture, and integration of related components. Integration of digital, optical, and micro-mechanical components with the millimeter wave circuits may be undertaken to increase overall functionality (e.g., for patient monitoring). The development and use of novel circuit, interconnection, and housing approaches is encouraged where it will lead to improved product characteristics and significant reductions in cost. In particular, attention should be directed toward producing thin (low-profile) or conformal antenna/component designs suitable for occupying minimum space within vehicles or for portable use by individuals. Proposers will plan to demonstrate that all necessary resources for producing the targeted products and capabilities are either in place or will be in place within the next 3 years and that widespread use of proposed products will begin within 3 to 5 years. Proposers must also demonstrate clearly why their proposed efforts require TRP funding. Proposed programs are expected to result in the delivery of functional demonstration samples ranging from components and modules through completed subsystems or systems.

3.2.10 Operations Other than War/Law Enforcement (OOTW/LE)

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With the passing of the old Soviet Bloc threat, our military has become involved in a large number of missions collectively referred to as Operations Other Than War (OOTW). These operations, which include peacekeeping and humanitarian aid, share many similar requirements with Law Enforcement (LE) -- requirements which, all too often, military systems are not designed to meet. This program will develop and apply technologies which can directly and affordably address these important military and law enforcement missions through a broad base, dual use effort. A common industry technology base will improve the capabilities of both the soldier and the law enforcement officer. Some typical technology objectives are offered below. Important to all of them is affordability.

- Individual Protection (e.g., lightweight body armor providing body extremity protection without hindering mobility)
- Concealed weapons detection capability that can penetrate clothing, packages, and walls; and positively identify handguns and knives
- Systems to support multinational or multilingual operations, such as language interpretation and translation to provide real time bi-directional speech translation
- Communications, tracking and monitoring devices, includes systems to covertly track vehicles (including water craft) and objects in local, regional, and global scenarios from fixed or mobile monitoring stations; miniature geo-location, navigation, and status reporting for individuals; and miniature, low power, highly stable (e.g.1x10-12) frequency references for rapid synchronization of radios and GPS receivers operating in the burst mode.
- Anti-mortar/anti-sniper systems that can detect hostile fire and direct return fire
- Information processing and distribution systems to specifically support OOTW/LE headquarters and field operations. This area may include interoperability of voice and data systems, and automated booking/case files and record systems. More general information systems may be proposed under the Digital Wireless and Networking Systems Focus Area.
- Interactive simulation and modeling for OOTW/LE training, mission planning, remote learning, and technology development planning.

Proposals are sought to develop prototype equipment and/or subsystems focused on military and civilian user demonstrations. Proposals should also demonstrate an understanding of the needs and limitations of both the OOTW and LE customers, while clearly articulating the many differences that exist between OOTW and LE in the area of policy, concept of operation, and rules of engagement. In addition, proposals should identify the military and commercial markets, and transition path from a TRP development to the military and civilian user.

3.2.11 Small Precision Optics Manufacturing Technology

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The objective of this focus area is to improve the cost effectiveness of manufacturing small precision optical components. Advances in optics based products will have a significant impact on national defense through performance improvements and cost reductions of remote sensing, and surveillance systems, flat panel displays, and other military systems. These advances will also play an important role in driving economic growth through emerging technologies that address critical national needs in the manufacturing, information technology, health care, transportation, environmental, and consumer and business sectors. Among the important commercial end-uses are high definition television (HDTV), optical communications, microlithography, and minimally invasive laser surgery. The affiliated products require high precision reflective and refractive optical elements such as aspherics, toroids, cylinders, diffractive optical elements and micro-optics. Many consumer and business products such as copying machines, laser scanners, laser printers, compact optical disks and camcorders require low cost high volume production of cylinders, toroids, prisms and micro-optics.

In this focus area, the optics fabrication industry will work with technology providers, system designers and end users in specifying technical requirements consistent with business goals for their markets. They will use these requirements to formulate a strategy to accelerate the development and dissemination of new low cost precision optics manufacturing capabilities and assembly techniques into commercial optics fabrication lines. In this way, proposers shall define a strategy to develop affordable small precision optics manufacturing technology and assembly techniques to be employed by the commercial sector, while ensuring that the Department of Defense (DoD) can exploit resulting products and manufacturing capability. Early product insertion, reduction in manufacturing costs, and improved system performance are the major benefits for defense.

3.2.12 Microelectromechanical Systems (MEMS) Applications

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This topic seeks to accelerate the affordability, manufacturability and insertion of microelectromechanical (MEMS) devices and systems. Starting from demonstrated MEMS devices and concepts, technology developments are expected to be focused by specific, dual-use products or markets that are driven by device affordability and manufacturability. Of particular interest are manufacturing technologies to produce a class of related MEMS devices from a single, common fabrication process including but not limited to: a range of embedded pressure sensors for passenger car, truck and aircraft tires; a range of fluid valving, regulation and metering devices for heating, ventilation, and air-conditioning equipment, process control, printers, and analytical instruments; a range of inertial sensors for application in condition-based maintenance and active vibration control; a range of high-value electromechanical components and subsystems that include disc drive read/write head gimbals and optomechanical couplers, aligners, and switches.

Defense uses for this new and exciting field include nearly all commercial applications listed above, plus military-specific applications, such as special mission scatterable devices. The small size and potentially very low cost of these devices are very appealing to all services.

Proposed efforts are anticipated to involve joint activities and partnership among MEMS product developers, manufacturers, system integrators and end-users. Scope of efforts should include tracking the impact of technology developments on manufacturing costs and an aggressive plan for the manufacture and insertion of products in explicitly identified defense and commercial systems.

3.2.13 Other

All proposals in technologies other than those listed above will be competed as a single, separate, highly-competitive category designed by the TRP as "Other." Like proposals in the twelve specified Focus Areas, these proposals must be focused on a specific technology and must make a clear case for its pervasive impact and Defense relevance.

3.3 Guidelines for Assembling a Team

Each Technology Development proposal must include two or more "eligible firms." A proposal that does not include at least two such firms will not be in compliance with TRP statutory requirements and cannot be selected for funding. An "eligible firm" is a company or other business entity (or a consortium of such companies), owned or controlled by U.S. citizens, that conducts a significant level of its research, development, engineering, and manufacturing activities in the United States. However, a company not owned or controlled by U.S. citizens may be eligible if it is a subsidiary of a parent company that is incorporated in a country whose government funds research and development consortia in which U.S.-owned subsidiaries can participate and affords adequate and effective protection for the intellectual property rights of U.S. companies. A foreign-owned company must still conduct a significant level of its research, development, engineering, and manufacturing activities in the United States in order to be eligible. A U.S. labor union is also, for the purposes of this TRP competition, an "eligible firm."

Teams may also include any other participants appropriate to accomplishing the project. Teams should demonstrate a collective "synergy" between partners that will enhance and improve the potential for a technology investment to yield a commercially viable and marketable, militarily-useful, dual-use product or process. Teams are encouraged to include both commercial and defense firms to achieve dual-use objectives.

The Government will be active in assisting with the formation of proposal teams prior to the date on which Concept Papers are due (expected to be December 21, 1994). Until then, interaction by potential proposers with the agencies making up the TRP—the Departments of Defense, Commerce, Energy, and Transportation, and the National Aeronautics and Space Administration and National Science Foundation—to investigate possible proposal teaming arrangements and proposal ideas is encouraged.

3.4 Cost Sharing Requirements

3.4.1 Background

TRP statutes require non-Government participants in all TRP projects to provide at least 50 percent of project costs. Cost sharing puts the offeror at risk, making the successful completion of the project in the offeror's best interests.

Funding for the Technology Development competition is derived from Congressional appropriations for Fiscal Year 1995 under three statutory programs: Defense Dual-Use Critical Technology Partnerships (10 U.S.C. § 2511), Commercial-Military Integration Partnerships (10 U.S.C. § 2512), and Defense Advanced Manufacturing Technology Partnerships (10 U.S.C. § 2522). The estimated funding to be available for each of these programs is shown in the table below. As the table indicates, the statutory requirements for cost sharing differ among the three statutes. Each proposal may be submitted to only one statutory program as described above. You are responsible for ensuring that your proposed cost share meets all statutory requirements for the program you select.

Statutory Program	Estimated FY1995 Funding	Minimum Team Share of Costs		
		Year 1	Year 2	Years 3-5
Defense Dual-Use Critical Technology Partnerships	$150M	50%	50%	50%
Commercial-Military Integration Partnerships	$70M	50%	60%	70%
Defense Advanced Manufacturing Technology Partnerships	$30M	50%	50%	50%

3.4.2 Cost Sharing General Principles

A general test for constructing your contribution should consider the following:

(a) Is the resource under the control of or used by the consortium (not by an individual consortium member)? If so, does it actually help with the project or, stated another way, is it germane to the overall statement of work?

(b) What is the fair market value of that resource?

(c) Generally, contributions by non-TRP Federal Government activities are neutral with regard to cost sharing requirements, counting neither as Government nor participant contribution. However, in Commercial-Military Integration Partnerships only, Federal funds may be used as part of the team's cost share. Excessive use of such cost share, however, will weaken the team's demonstration of commitment.

Contributions not allowed as part of cost share include foregone fees and profits on the proposed TRP program; costs previously incurred (e.g., past expenditures to develop technology or intellectual property—but use of previously-developed intellectual property may be a valid contribution if it meets the criteria for in-kind contributions), and cost of work done on past or concurrent government contracts.

3.4.3 Cost Share Classifications

Cost share is classified as either cash or in-kind as follows:

3.4.3.1 Cash

(a) Cash contributions are outlays of funds to support the total project through acquiring material, buying equipment, paying labor (including benefits and direct overhead associated with that labor), and other cash outlays required to perform the statement of work. Government IR&D (Independent Research and Development—see FAR 31-205-18(e)) funds are considered by TRP to be the proposers' own funds and may be used as a source of cash for TRP projects, even though they remain eligible for reimbursement by the Government. Cash can be derived from any source of funds within the participating partners' accounting systems. Cash also can be derived from outside sources, such as donations from state or local governments or funds from venture capitalists.

(b) A participant's cash contribution may include revenues from any non-Federal source, including non-Federal contracts or grants. Profit or fee from a Federal contract (other than the TRP project) may also be included. Under certain circumstances, Federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) funds may also count as cash, as described in Section 3.4.4.2.

3.4.3.2 In-Kind

(a) In-kind contributions are the reasonable value of equipment, materials, or other property used in the performance of the statement of work. Generally, in-kind contributions are hard to see and value (such as space or use of equipment) and intellectual property (technology transfer activities). In particular, when proposing intellectual property for in-kind cost share, the offeror should consider the following: Is its use central to the project; is it a real or incidental resource; what is the fair market value of the intellectual property as it is actually used on the project?

(b) Technology transfer activities may be included in a participant's contribution subject to an evaluation of the value of such activities to the Partnership and a limit of their value to no more than the prior investment in the proprietary technology involved.

(c) The in-kind value of equipment (including software) shall not exceed its fair market value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

(d) The in-kind value of space (including land or buildings) shall not exceed its fair rental value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

The TRP Technology Development competition includes the quality of cost share as part of its evaluation of a proposers' commitment to commercialize and productize the results of the partnerships efforts.

3.4.4 Special Provisions for Small Business

3.4.4.1 Additional Time To Secure Cost Share

As part of the Fiscal Year 1995 Defense Department Authorization, Congress sought to increase the participation of small business concerns in the TRP Technology Development Competition Area by providing them with additional time to obtain the minimum 50% required cost share:

In order to implement this language, evaluation of proposals in the Technology Development Competition Area will assume that cost share offered by any small business concern is of highest quality and will be available to the proposing team. Once a team's proposal including small business cost share is selected for negotiation leading to possible award, team participants will have an additional 120 days to provide acceptable documentation of the availability (from sources other than persons of a foreign country) and quality of the proposed cost share. If the team cannot provide such documentation or, alternatively, restructure the proposal's cost sharing so that it meets the statutory requirements without the proposed small business contribution, then the TRP may revoke the selection of the proposal and discontinue negotiations with the team.

3.4.4.2 Use of SBIR and STTR Funds as Non-Federal Cost Share

A small business participant's cost sharing contribution in a TRP project may include funds received under a Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) contract. This can be the case whether the SBIR or STTR was awarded by the TRP or by some other agency. The SBIR or STTR effort must meet one of two tests if its funding is to be counted as cost share. Either:

- The work to be done (under the SBIR or STTR agreement) is clearly identified ("embedded"—see below) in the TRP proposal as part of the overall TRP project and integral to the proposed TRP effort; or

- If not integral to the TRP proposal, the work to be done under the SBIR or STTR project is clearly related to the work being performed under the TRP agreement and capable of being integrated into that effort.

Unexpended SBIR or STTR funds that remain available **at the TRP proposal due date** may be counted as cost share in the event your proposal is selected by the TRP. Note that funds expended after the proposal due date but before the commencement of work under the TRP agreement may be counted as cost share.

Funds expended prior to the FY95 TRP proposal due date will not be considered cash but may be considered as an in-kind contribution to cost share. Offerors should refer to Section 3.4.3.2 for more information about in-kind contributions.

It is a statutory requirement prerequisite to the counting of SBIR or STTR funds as cost share that the small business offering these funds must participate in the TRP project at a level of contribution and participation sufficient to demonstrate a long-term financial commitment to the product or process development involved in the TRP project that is comparable to the commitment of the other non-Federal participants on the team.

As described above, small businesses can associate with partners and "embed" or incorporate a Phase I effort into a TRP proposal. The funds received from the SBIR effort could contribute $99,000 of the TRP cost share requirement if the TRP proposal and its "embedded" SBIR proposal are both selected.

TRP proposals that include an embedded SBIR proposal must include a brief discussion of the SBIR effort within the technical discussion of the TRP proposal itself. This discussion should include a description of the SBIR project objectives and the relationship and relevance of the SBIR effort to the overall objectives of the proposed TRP effort. The anticipated cost share gained from the inclusion of the SBIR effort must be noted under the "Other" category in the cost section of the TRP proposal. The SBIR proposal, describing the proposed effort in detail, must be prepared in accordance with standard SBIR program requirements and submitted separately from the TRP proposal.

3.5 Selection Criteria

The following selection criteria are for the Technology Development competition only and incorporate all statutory selection criteria for the three statutory programs under which the competition is being conducted. The four criteria, listed below, are the same as in previous competitions, with each criteria restated to improve clarity at the sub-criteria level. The first three major criteria and sub-criteria all carry equal weight in the evaluation. The fourth criterion, Pervasive Impact, is weighted the same as the first three criteria, but both of its two sub-criteria must be present in the proposal for either to be evaluated and weighted.

3.5.1 Scientific and Technical Merit

Technical Quality

- The proposed effort advances the technology or process beyond current state of the art.
- The proposed effort is clearly superior, innovative or unique.

Feasibility

- The proposed effort shows feasibility, consistent with the emerging state of the art and proposed cost.

3.5.2 Technical Approach and Management Plan

Quality, Clarity of Technical Plan, Quality of Resources

- A clear technical approach and objectives, consistent with definitive milestones and with definitive end point.
- A coherent approach to mitigating technical risks.
- A balanced and high quality personnel staff, equipment and facilities which are dedicated to the project .

Strength of Team and Handling of Intellectual Property

- Evidence that common interests and direction on part of all participants guide management of proposed team and proposed technical approach.
- Explicit methods by which intellectual property (IP) will be shared within and outside the team to ensure successful completion of the project are required.

3.5.3 Commitment to Productization in the U.S.

Sustainability

- Commercial viability in the United States or Canada within 5 years without Federal funds.
- Expertise in commercialization and knowledge of a market in which customers will favor proposed product or process resulting from this effort.
- Available or potential sources of funding for productization.

Cost Share/Risk

- Assumption of risk by the team members, including but not limited to, availability and quality of proposed cost share and future financial commitments.
- The following four categories of cost share are ranked according to quality:

  Highest Quality Cost Share—Commitments of unencumbered financial resources, including cash, compensated personnel time, and other highly liquid and fungible assets which are demonstrated to be immediately available to project managers to apply to TRP efforts. Cash contributions are considered highest quality match because they are easiest to value and generally put the offeror at greater risk—i.e., demonstrate greater commitment.

  Moderate Quality Cost Share—In-kind commitments of resources, including the fair market rental value of facilities and equipment dedicated for use in the TRP effort.

  Low Quality Cost Share—Non-dedicated personnel, non-dedicated in-kind equipment or facilities, and other resources not exclusively under the control of project management.

  Poor Quality Cost Share—Cash or in-kind cost share whose actual availability to the proposed task is not clearly and convincingly demonstrated in the proposal.

3.5.4 Pervasive Impact

Defense relevance: As a result of future commercialization of product/process:

- A critical defense technology is preserved,
- A defense capability is more affordable, or

- A significant improvement in health, safety or environment (especially in Manufacturing) is accomplished.

Commercial market: As a result of future commercialization of product/process:

- Market and market share is established, and
- Creation of high quality jobs through expansion of product or production base is accomplished.

3.6 Proposal Instructions

TRP Technology Development proposers shall prepare a technical proposal and cost proposal according to the following formats and responding to the above selection criteria. Discussion is provided to assist proposers with organizing their submissions.

3.6.1 Technical Proposal Contents

Technical proposals shall be a maximum of forty (40) pages and shall include the following four sections:

3.6.1.1 Section 1—Executive Summary

The Executive Summary shall provide a brief technical and business description of the contents of the proposal. The technical area should be written to cogently define your proposal's technical goals, the technical approach you are taking, and the expected technical result. Its purpose is to provide technical reviewers an overview of the technologies proposed. The business area should be written to explain strategic alliance, business, and market issues which successful commercialization and productization will involve. It should reflect that the team has thought through the potential business, market, and economic implications if the technical goals of the project are achieved. Parties should demonstrate that there is, indeed, a shared or common team vision.

3.6.1.2 Section 2—Technical Issues

This section of the technical proposal shall give a detailed explanation of the technical approach, planning, merit and benefits to be derived from the proposed technology development effort activities. This section should address all technical aspects of the proposed project as they relate to the selection criteria for Technology Development. Proposers should insure that their discussions, as appropriate, address the following points:

Technical Objectives Discuss clearly and specifically in realistic terms the technical objectives of this proposed effort. This should include all of the following:

- A clear, definitive statement of the objective or end product of your effort.
- A technical description of your technical activities in sufficient detail to determine the technical feasibility of the effort and the degree to which it improves on the current state of the art.
- A discussion of the technical barriers to be overcome and the technical risks expected during the conduct of the project. Note: technical risks are expected and acceptable provided they are well understood and approaches are presented to mitigate them.
- A discussion, quantitative whenever possible, of the advantages (cost, performance, time to market, etc.) of the proposed technologies over alternatives.

- If they exist, a discussion of other related projects (especially those funded by the Federal Government) and a clear demonstration that this effort will not duplicate those efforts.

Technical Approach: Discuss your approach for achieving the technical objectives of this project. This should include all of the following:

- A comprehensive description of your specific approach, including the advantages over other possible approaches which could be used to attack the problem.
- A clear plan for mitigating all identified risks, describing alternate approaches to be taken if the planned mitigation efforts are unsuccessful.
- A Statement of Work (SOW) that discusses the specific tasks to be accomplished, tied to the specific approach and goals of the project. Specific performers for tasks should be identified whenever possible.
- A schedule of significant events and measurable technical milestones. This schedule should extend beyond the end of the TRP project and include critical technical milestones for commercialization or productization.

Quality and Appropriateness of Technical Staff and Resources: Provide the experience and credentials of the technical team assembled to carry out the developments proposed. Include all of the following:

- A description of the management organization to be used for this effort, including a discussion of the proposed lines of responsibility, authority, and communication through which tasks will be managed and the procedures taken to insure quality control and cost control.
- A discussion of the qualifications of each of the organizations involved in the effort in sufficient detail to demonstrate that the collective experience and expertise embodied on the proposal team is necessary and sufficient to ensure technical objective are met.
- A demonstration that the resources available for the proposed activity, including facilities, equipment, and technical support, are necessary and sufficient to accomplish the objectives. Special attention should be paid to describing the necessity of those resources which are used as cost share.
- A discussion of how intellectual property (especially that proposed as cost share) is to be used as a necessary resource to accomplish the objectives of the project.

Management of the Proposed Team: Provide a discussion of the team and its structure in terms of its ability to successfully conduct the TRP project and to succeed in ultimate commercialization or productization. Include all of the following:

- A description of the team including a presentation of the clearly delineated role of each organization in the team and the benefits which accrue to each member as a result of participation in this project. This description should also include a discussion of the complementary strengths and offsetting weaknesses of team members which contribute to the overall strength of the proposed team and project.
- The plan for managing the team, including the mechanics (voting, vetoing, etc.) for coordination and approval of team activities. This should include provisions for addition or withdrawal of members and early detection and resolution of issues. The plan for interacting with the Government should also be discussed.
- A discussion of the methods by which intellectual property will be protected and controlled, within and outside the team, including foreign access to that intellectual

property. The degree to which intellectual property is shared among the partners should also be discussed.

- Any anticipated restrictions on the Federal Government's rights in intellectual property developed under this effort that are necessitated by business requirements.
- A discussion of and justification for any intended transfer of technology developed under this program to foreign entities.

3.6.1.3 Section 3—Business Issues

All proposers shall provide a discussion of the business issues facing their team and proposed commercialization development activities. This Business Issues section should include all information necessary for evaluators to make an informed judgment regarding the business aspects of the proposed project as they relate to the selection criteria. While TRP does not require a formal "business plan," it is believed that the most readily accessible form for presenting a discussion of pervasive impact and commitment to productization is to provide a developed business plan.

Proposers should insure that their discussions at a minimum address the following points:

Sustainability to Commercialization or Productization: The proposal should demonstrate the commitment required to successfully accomplish the proposed project *and* to continue the effort toward successful entry into a viable commercial market. The proposal should include the following:

- A description of how the collective experience and expertise of the team will lead to the commercialization of the products or processes to be developed under this project. If possible, this should include current products or services of the team members which demonstrate knowledge of and know-how in the development and commercialization or productization of the specific technology activities proposed.
- A discussion of the level of involvement and commitment of senior management of each member of the team.
- A discussion of the sources of any long term financing necessary to continue the team activities past this project and into commercialization or productization.
- A discussion of the long term goals and activities of the team including the projected life span of the team, the role of each member of the team in the production and commercialization activities and the plans for specifying future investments and division of profits or loss among the team members.
- A discussion of the balance of the proposal team in terms of its ability to transition this effort from development through commercialization or productization, including manufacturing and marketing expertise as required.

Demonstration of Commercial and Defense Impact: Proposals must demonstrate both a defense and a commercial impact. Commercial value alone, no matter how compelling, without a clear demonstration of the value to defense, is not sufficient. Proposals should include the following:

- A realistic, quantitative discussion of the intended commercial markets. This must include a discussion of your primary customers and the specific advantages accruing from this effort which will ensure an advantage over competitors. When lower cost is basis for the competitive nature of your product, sufficient pricing data must be presented to evaluate your claims.
- A discussion of the long-term, commercial value of the proposed effort, in terms of both market share and the establishment of high quality job opportunities, which demonstrates how this value justifies the investment.

- A discussion of how the ultimate product or process of this effort will benefit defense. This may be embodied in any of the following ways:
  - i) Develop an important new technology for DoD
  - ii) Assure DoD access to existing technology in a manner usable to DoD, regardless of political stress
  - iii) Provide new commercial markets for needed defense industrial capability that cannot be sustained by DoD alone
- If applicable, provide evidence of the beneficial effects which will accrue as a result of this effort to society at large through elimination or reduction of health, safety, and environmental hazards, especially in relation to the development or improvement of manufacturing processes.

Cost Share and Risk: The proposal should demonstrate a commitment on the part of the team members to share the cost and risk of the proposed effort with the TRP. The proposal should include the following:

- A detailed description of the cost share for this effort, including the sources (which members) and the type (cash, in-kind). With the exception of small business, which has 120 days after selection to obtain funding (see Section 3.4.4) the immediate availability of this cost share must be apparent.
- A discussion of the risk, if any, incurred by the team members other than cost share described above. This could include any changes to corporate strategies, long-term commitment of resources or other consequential changes to the team members.

3.6.1.4 Section 4—Selection Criteria Index

A one-page index showing the pages on which each of the selection criteria is addressed is required.

3.6.2 Cost/Funding Proposal Contents

Cost/funding proposals are limited to fifty (50) pages in length, have no specific page layout requirements, and shall address funding periods of performance as described in Section 3.7, below. Work Breakdown Structures or certified cost or pricing data are neither required nor desired.

Cost/funding proposals will be organized to include four sections in the following order: total project cost, cost sharing and in-kind contributions, cost to the government, and off-budget supporting resources.

3.6.2.1 Section 1—Total Project Cost

This section will give a detailed breakdown of costs of the project. Cost should also be broken down on a task-by-task basis for each task appearing in the Statement of Work. This must include all of the Cost to the Government and Cost Sharing

The following information should be presented in your proposal for each phase of the effort: total cost of the TRP project; total contribution proposed by the consortium; total proposer cost share; funding requested from TRP; and Elements of Cost (labor, direct materials, travel, other direct costs, equipment, software, patents, royalties, other costs, indirect costs, cost of money, or profit). Sufficient information should be provided in supporting documents to allow the government to evaluate the reasonableness of these proposed costs, including salaries, overhead, equipment purchases, fair market rental value of leased items, and the method used for making such valuations.

3.6.2.2 Section 2—Cost Sharing and In-Kind Contributions

This section will include: (1) the sources of cash and amounts to be used for matching requirements, (2) the specific in-kind contributions proposed, their value in monetary terms, and the methods by which their values were derived, and (3) evidence of the existence of cash or commitments to provide cash in the future. Affirmative statements are required from outside sources of cash.

Proposals should contain sufficient information regarding the sources of cost share so that a determination may be made by the government regarding the availability, timeliness, and control of resources. How will the funds and resources applied advance the progress of the proposed effort? What is the role of any proposed in-kind contributions?

The TRP Technology Development competition includes the quality of cost share as part of its evaluation of proposers' commitment to commercialize and productize the results of the team efforts.

3.6.2.3 Section 3—Cost to the Government

This section will specify the total costs to be borne by the Government and any technical or other assistance including equipment, facilities, and **personnel of Federal laboratories** required to support these activities. The Cost to the Government should be that portion of the proposed effort which is not covered by your cost share.

Proposals should contain sufficient information regarding the resources to be provided by the Government so that an evaluation of their availability, timeliness, and control may be made.

3.6.2.4 Section 4—Off-Budget Supporting Resources

This section will show cash or in-kind resources which will support the proposed activity, but which you do not intend to include in the total project cost. Items in this category do not count as cost share nor as Federal funds which must be matched.

Examples of items to place in this category include: Commitments of cash or in-kind resources from other Federal sources, such as national laboratories; and, projections of fee-based income where there is substantial uncertainty about the level which will actually be collected, and where the income is not needed to meet cost-share requirements.

3.6.3 Additional Proposal Considerations

3.6.3.1 Proposal Page Formats

The technical and cost proposal page count shall include every page, including pages that contain words, table of contents, executive summary, management information and qualifications, resumes, figures, tables, and pictures. All proposals shall be printed such that pages are single-sided, with no more than fifty-five (55) lines per page. Use 21.6 x 27.9 cm (8 1/2" x 11") paper or A4 metric paper. Use an easy-to-read font of not more than about 5 characters per cm (fixed pitch font of 12 or fewer characters per inch or proportional font of point size 10 or larger). Smaller type may be used in figures and tables, but must be clearly legible. Margins on all sides (top, bottom, left and right) must be at least 2.5 cm. (1").

3.6.3.2 Term of Awards

Technology Development proposals should include budgets with a base term of 12 to 24 months with optional additional terms of 12 to 24 months each. The government may fund both base term and options from the present appropriation depending on the content of the proposal, the availability of funds, the fit with other programs, and any other considerations necessary to establish and maintain program coherence and balance. The government may also choose to

condition the exercise of options on the availability of future year appropriations or other funding sources.

3.6.3.3 Orals, Interviews, and Site Reviews

During the proposal review and final stages of selection process, proposers may be asked to give oral presentations to members of the selection panel or staff, or travel to Washington or other locations for an interview. The TRP also reserves the right to conduct site reviews.

3.6.3.4 Reporting Requirements and Metrics

All awardees will be required to make periodic reports on technical progress and financial outlays associated with their TRP project. In addition, awardee teams will be expected to have developed a commercialization plan for the activity stimulated by the TRP award. This plan will typically extend beyond the period of performance of the TRP to the point of full commercialization. Such reports are not intended to constitute an onerous burden on awardees. Their purpose will be to assist TRP management with monitoring progress towards stated project goals as well as a means to determine the overall degree to which the TRP is succeeding or failing. The Government will not take possession of this plan.

3.7 Submission of Concept Papers

TRP will accept and review "Concept Papers," summarizing the project that is to be the subject of a proposal, from prospective proposers. The purpose of these Concept Papers is to improve the overall selection rate for this competition. Submitters of Concept Papers should use feedback from this process to make their own decision on whether to prepare a full proposal. It is TRP's goal in using Concept Papers to discourage full proposals from submitters whose proposal concept would have a low probability of being funded by the TRP and to provide constructive feedback to those proposers whose ideas have a better likelihood of success.

Specific recommendations made by TRP in response to a Concept Paper are advisory in nature ONLY. Further, proposers who do not submit a Concept Paper are permitted to submit a full proposal in response to the formal solicitation. REGARDLESS OF THE OUTCOME OF THE TRP'S EVALUATION OF YOUR CONCEPT PAPER, YOU MUST LATER SUBMIT A FULL PROPOSAL IN ORDER TO BE CONSIDERED IN COMPETITION FOR RECEIVING A TRP AWARD.

3.7.1 Format

The TRP Concept Paper must be no more than 5 pages long, excluding cover sheets.* Any additional pages, including resumes or supporting documents will not be reviewed. While it is understood that all details of a concept/proposal will not be fully developed, the Concept Paper should provide enough information to permit an adequate review against all the published selection criteria. Emphasis should be placed on explaining the technical merit of the concept and demonstrating the impact to Defense and the existence of a viable commercial market. Planned partnerships and cost sharing should also be discussed, but it is understood these will be less developed. Like a full proposal, Concept Papers should be proposed into a specific Focus Area (see Section 3.2).

* A sample cover sheet appears at the end of this PIP, following Appendix A.

3.7.2 Concept Paper Review/Feedback

It is anticipated that feedback to submitters will be in the form of a qualitative rating of the Concept Paper for each criteria. Feedback would also include the number of Concept Papers submitted in that Focus Area and guidance which will assist proposers in the decision about whether to submit a full proposal.

TRP cannot guarantee that the review of a five-page Concept Paper will correlate exactly with the evaluation of a full proposal. This process is intended as guidance only.

3.7.3 Schedule

Concept Papers must be received by 4:00 PM on December 21, 1994. They should be sent or delivered (to the 8th floor mail room) to the following address:

Technology Reinvestment Project
Advanced Research Projects Agency
3701 N. Fairfax Drive
Arlington, VA 22203-1714

A Concept Paper received after the exact time specified for receipt will not be considered unless: (a) it was sent by registered or certified mail not later than December 16,1994 or by U.S. Postal Service Express Mail Next Day Service-Post Office to Addressee on or before 4:00 PM at the address of mailing on December 19, 1994 or (b) it was sent by mail and it is determined by the government that the late receipt was due solely to mishandling by the government after receipt at the government installation.

Concept Paper review is expected to take approximately 3 weeks, with feedback letters mailed within two weeks after that. TRP will not provide any interim feedback, nor will TRP provide any results ahead of this schedule.

TRP will make every effort to meet this evaluation schedule, but the actual schedule will depend on the number of Concept Papers received. **However, the formal solicitation for this competition will not be published until one week after the mailing of the last Concept Paper review.**

4. REGIONAL TECHNOLOGY ALLIANCES COMPETITION AREA

4.1 Description

4.1.1 Basic Concept

The Regional Technology Alliance (RTA) program seeks to enhance regional industrial capabilities that are important to national security. The program recognizes that industries concentrate geographically (e.g., aerospace, electronics) and that these concentrations of industrial capability and expertise are often an important source of technological innovation and competitive advantage.

The TRP will solicit proposals for projects that enhance dual-use industrial capabilities by employing, adapting and demonstrating, or developing a specific technology. Proposed efforts must benefit both national security and the ability of regional firms to compete commercially. As evidence of that, firms inside the Alliance must show a clear commitment to use the improved capability in their commercial business if it is successfully developed.

4.1.2 Characteristics of an RTA Project

Successful RTA proposals must result in a dual-use technology or technical capability that is *measurable*: a new product, process, industrial standard, testbed, manufacturing practice, network, or similar advancement. The proposal must define a specific technical approach, and the project must improve the technical capabilities of for-profit firms in the RTA in a way that is *demonstrable*. For example, the RTA might test the new process, standard, or practice by demonstrating it on the pilot manufacturing lines of several member firms.

Regardless of its specific thrust, an RTA project must entail some technical risk. A proposal merely to integrate off-the-shelf technology, replicate an already demonstrated and fielded capability, or create a new "center of excellence" will not compete well. Alliances will be judged by the same selection criteria whether they are pre-existing or formed specifically to propose to the TRP.

Proposals must demonstrate that the proposed RTA has the appropriate mission, members, and management approach needed to conduct all phases of the project. An organization affiliated with a State or local government or a university—designated by State or local government—from the region must belong to the RTA, but there must also be strong industrial leadership. The role of the governmental organization or university will depend on the specific project, but generally it will be expected to look after the broad economic interests of the region. For example, it might be responsible for eventually distributing the new technology to firms within the region that do not belong to the RTA.

The proposal must define the geographic region of the RTA project. This region need not conform to established political boundaries; instead, it should be designed to encompass economic concentrations in a particular industry or technology. The RTA proposal must make the case that its region has special attributes that make it more likely that a successful TRP project will lead to improved dual-use products and processes. A promising region will have a high density of, or close linkages between, producers, suppliers, and supporting institutions in a particular technology or industry. Evidence here could include, but is not limited to:

- Significant market share by the region in a particular industry;
- A major share of the region's output and employment by that industry;
- Accessible local sources of relevant new technology from universities, federal laboratories, and non-profit research institutes;

- A specialized, skilled labor force in that technology/industry — from production workers to managers and engineers;
- Local financiers who are familiar with the region's industry and technology and who invest or lend there.

Keep in mind that the issue for the TRP is not *where* the region is, but *what* and *who* is located in it. Firms in a Regional Technology Alliance must show a clear, firm commitment to use the improved technical capability in their commercial businesses if it is successfully developed. One straightforward way to demonstrate this is to include some "customers" or users for the technical capability in the Regional Technology Alliance.

Moreover, the proposal must clearly show how using this technical capability will help member firms compete in both the commercial and Defense marketplaces. The commercial competitive advantage created by the new technology and its leverage and benefit to national security must be explicit. Projects that offer little or no benefits to Defense, even if they are commercially advantageous, will not be funded.

4.1.3 Summary

RTA proposals must show that:

- There is a well-defined and sound project plan to develop a specific technology or technical capability that has some technical risk
- Members of the Regional Technology Alliance are committed to using the new technology or technical capability for their commercial advantage
- The new technology or technical capability will produce benefits for the DoD when used by member firms
- The self-defined region is an advantageous setting for the project
- Firms in the region will benefit in a lasting way.

4.1.4 Regional Technology Alliance Examples

Example 1: A project is proposed to develop and demonstrate a new manufacturing process to produce a specific electronic component at greatly reduced cost. The region is defined by the proposers to be the northeast corner of a state, which includes a state university, a Defense laboratory, several electric component manufacturers, and a dozen firms who use the component in a variety of electronic products in both the commercial and Defense market. This region is responsible for 30% of U.S. output of this component and the electronics industry is the second largest industry in the region.

The state university is world-renowned for its work on electronics manufacturing, and the Defense laboratory is responsible for the electronics R&D program of one of the military services. This local technical expertise, coupled with the density of nearby electronics firms, makes this region a particularly good setting to address critical issues in manufacturing electronic components.

The device manufacturers, ten of the electronic product manufacturers, the state university, and the Defense laboratory have joined together to form a Regional Technology Alliance. They will develop a new "intelligent process" for manufacturing the electronic component which, if successful, will increase the manufacturing yield by an order of magnitude at each (potentially) of the ten firms. This new process, the subject of research at the university and Defense lab for several years, has never been fully prototyped and faces a number of well defined technical hurdles, yet it remains promising. Since this component is crucial to three Defense systems now being produced by firms in the region and its cost currently accounts for 25% of the cost of a

dozen commercial products, success will make these systems and products available at a significantly lower price to Defense and commercial customers.

Process demonstrations, including tests of device quality, will be run first at the university, then at the component firms. Five of the electronic product manufacturers will, as part of the project, produce prototypes of current products on their existing production lines using components made using the new process. They will perform reliability and other quality control tests. The Defense laboratory will test and certify several products of high interest to DoD.

If the project is successful, the ten electronic product manufacturers will incorporate the component produced by this new, less-costly process into their product lines. Each of the firms has committed to a different product, some being purchased for Defense use and some having a large potential commercial market. This commitment includes the identification of specific resources for manufacturing upgrade, a timetable for production and the estimated cost reductions expected through using the less expensive process.

Lowering the cost of the specific electronic component would dramatically lower the cost of making a wide variety of other products produced by the firms in the region. The state's regional economic development office is participating in the proposal by supporting the work at the state university and will encourage other firms to adopt the new process. Upon completion of the project, the Regional Technology Alliance will remain in place to address other electronics manufacturing issues outside the scope of this project.

Example 2: A Regional Technology Alliance includes two major aircraft integrators—one primarily Defense-oriented, the other primarily commercial—several machine shops and fabricators, and State X's Economic Development Department. The Alliance proposes to develop and deploy an electronic specification, bidding, and billing system. All the firms are located near each other in the eastern quarter of State X and the adjacent western quarter of State Y. Two local universities, one private, one public, are also participants. The Alliance also includes the regional telephone company, which is providing high-bandwidth interconnection for the Alliance members at a reduced rate for four years beginning two years after the TRP-funded activity ends. For their TRP project, the Alliance will: (1) modify and integrate the commercial aircraft integrator's custom software developed for related applications, (2) alpha test a prototype system at one of the universities, (3) beta test the system at one of the integrators and four supplier organizations. This project will include training for the suppliers in use of the system and an on-line help system.

The integration of three-dimensional aircraft parts digital specifications with testing criteria, integrated progress tracking, and a billing and reimbursement system among a group of firms has not been done before because of the many interface and interoperability problems. A workable system should result in a 20% reduction in the cost of parts, but, more importantly, it should enable the suppliers to be included in the design process, thereby allowing early redesign of parts that are expensive and difficult to fabricate in large lot sizes. Overall this new system should trim at least 3 months off the design and scale-up phase for a new plane and significantly reduce their final cost. Both of these advantages were shown to be critical in the burgeoning competition for commercial aircraft sales in Asia.

The concentration of aircraft industry integrators and suppliers in a small geographic area is key to the success of this project. This particular region produces 60% of the U.S. output in one class of commercial aircraft. While the integrators and suppliers still sell almost 30% of their total output to the military, overseas sales have cushioned the impact of the Defense drawdown. The aircraft industry is the largest employer in the region and the highly-skilled labor force is one of the world's best. One of the universities has a Federally-funded information infrastructure program and testbed. The other university has a strong aerospace engineering department with a continuing education program that includes many of the Alliance participants.

The integrators and suppliers are each investing in the hardware and software necessary to implement this system. The integrators have committed to fund four training sessions to initiate the

full system after beta testing is successful. One integrator plans to use this new system when designing its newest family of aircraft, while the other will use it to lower the cost of its current biggest seller.

Because much of these firms' production still goes to the military, the testing will feature specifying, ordering, and billing for parts used by the military and switching part orders back and forth from their somewhat different Defense and commercial configurations. Overall, this new system should reduce the cost of parts for military aircraft by some 20% while making them as available on short order as commercial parts.

If the TRP project is successful, the Regional Technology Alliance will make the software available to all of the firms in the Alliance. Eventually, it will also make it available to other firms in the region who do not belong to the Alliance. In addition, the Alliance will undertake other electronic integration projects without TRP funding.

4.2 Background Information

4.2.1 Concept Paper Opportunity

Alliances interested in the Regional Technology Alliances Competition Area may submit "Concept Papers" before investing time and effort in the development of a full proposal and receive a formal response. Submitting a Concept Paper is not a requirement, but it is strongly encouraged. Complete instructions for submitting a Concept Paper may be found at the end of this section.

4.2.2 Tentative Schedule

The following is the planned schedule for the Regional Technology Alliances Competition:

Publication of Announcement in Commerce Business Daily (CBD):	October 21, 1994
Outreach Period:	October 21, 1994 - December 21, 1994
Due Date for Concept Papers:	December 21, 1994
Publication of Solicitation:	February 3, 1995
Due Date for Full Proposals:	March 17, 1995
Publication of Selections:	May 1995
Completion of Negotiations:	September 1995

4.2.3 TRP Outreach Activities

The TRP plans to conduct a variety of outreach activities around the United States up until December 21, 1994. Information about TRP-related meetings, publications, and other outreach activities can be obtained by calling the TRP at 1-800-DUAL-USE.

Each state has identified a point of contact to provide additional coordination and information for companies within the state wishing to participate in TRP. Activities sponsored by a state may include networking opportunities, proposal workshops, or development of a partnering database. Although the TRP staff in Washington coordinates some activities with these representatives, it is important to note that the TRP cannot endorse state policies and selection criteria as part of the TRP process. A list of the state representatives, as provided to the TRP, appears in Appendix A.

4.2.4 TRP Funding Instruments

TRP recognizes that the typical Government procurement contract cannot provide the flexibility that is needed in the R&D environment. In the TRP environment it is often difficult to

state the tasks to be performed with great specificity. Extensive involvement of government personnel is often required, and the sharing of costs is required. Flexibility in the allocation of rights to intellectual property (patents, trademarks, copyrights, trade secrets) may be necessary to induce participation, particularly by companies from the for-profit sector who have no prior experience as Government contractors.

Because contracts—more precisely, procurement contracts—are properly used only when the primary purpose is to acquire supplies and services for the direct benefit of the Federal Government, not to advance the state of the art, improve the technology base, demonstrate the feasibility of a new technology, or meet one or another of the objectives of the TRP, it is anticipated that no procurement contracts will be used for TRP programs except as may be required for SBIR projects.

Government-sponsored research efforts typically use grants and cooperative agreements when the purpose of the effort is to transfer something of value to a recipient to support and stimulate R&D for some public purpose. Government funding is more in the nature of an investment than a purchase in such situations. A grant is appropriate when the degree of involvement of the government agency is not expected to be substantial; substantial government involvement calls for a cooperative agreement instead. In both cases, the usual procurement contract regulations generally do not apply, so there is some flexibility to tailor the agreement to meet the needs of the participants.

"Other transactions" are just that—any form of transaction that is not a grant, contract or cooperative agreement. These may include (but are certainly 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.

Most TRP awards will result in cooperative agreements or other transactions. The contracting authorities and policies of the six TRP agencies are not all the same. Different agencies have different contracting authority under their organic statutes and under the regulations which govern their operations. While this discussion of funding instruments is based on ARPA's authority, it is applicable, for the most part, to the other TRP agencies. All the TRP agencies are committed to being flexible in their contracting practices in order to meet the needs of TRP awardees insofar as possible under their statutes and regulations.

4.2.5 Limitations on Foreign Access to TRP-Funded Technology

The Department of Defense Authorization Act for Fiscal Year 1995 includes a statutory condition on the funding of TRP projects that "the principal economic benefit of, and, to the extent practicable, the job creation resulting from [TRP projects] accrue to the economy of the United States." This philosophy was a cornerstone of TRP policy before its enactment by Congress. In keeping with both philosophy and legislative directive, TRP agreements include a provision requiring the participants to disclose to the Government certain forms of transfers of technology to foreign entities and to obtain permission prior to implementing such transfers. The controls contemplated in this provision are in addition to, and do not change or supersede, the provisions of the International Traffic in Arms Regulation (22 CFR pt. 121 et seq.), the DoD Industrial Security Regulation (DoD 5220.22-R) and the Department of Commerce Export Regulation (15 CFR pt. 770 et seq.)

Transfers governed by this provision include the sale of a company, and sales or licensing of technology. The notice and approval requirement does not apply, however to:

- sales of products or components, or
- licenses of software or documentation related to sales of products or components, or

- sales of products or components, or
- licenses of software or documentation related to sales of products or components, or
- transfers to foreign subsidiaries of TRP Alliance participants for purposes related to the TRP project, or
- transfers which provide access to technology to a foreign firm or institution which is an approved source of supply or source for the conduct of research in the TRP project provided that such transfer shall be limited to that necessary to allow the firm or institution to perform its approved role in the TRP project.

4.2.6 Historically Black Colleges and Universities and Minority Institutions

Historically Black Colleges and Universities (HBCU's) and Minority Institutions (MI's) are encouraged to participate as team members in the Regional Technology Alliances Competition Area. In any case in which the evaluation of two or more proposals is substantially equal, preference for award will be given to those proposals which include HBCU's and MI's as participants over those which do not include an HBCU or MI.

4.3 Competition Focus Areas

The twelve focus areas described in the Technology Development Competition Area (described in Section 3.2) are of particular interest, but proposals in other areas will be considered as well.

4.4 Guidelines for Assembling a Team

The participants in a Regional Technology Alliance shall include "eligible firms"* that conduct business in the region **and** a "sponsoring agency."

An "eligible firm" is a company or other business entity (or a consortium of such companies), owned or controlled by U.S. citizens, that conducts a significant level of its research, development, engineering, and manufacturing activities in the United States. However, a company not owned or controlled by U.S. citizens may be eligible if it is a subsidiary of a parent company that is incorporated in a country whose government funds research and development consortia in which U.S.-owned subsidiaries can participate and affords adequate and effective protection for the intellectual property rights of U.S. companies. A foreign-owned company must still conduct a significant level of its research, development, engineering, and manufacturing activities in the United States in order to be eligible. A U.S. labor union is also considered an eligible firm for the purposes of this competition.

The sponsoring agency may be any of the following:

- an agency of a State or local government;
- a nonprofit organization established, or performing functions, pursuant to an agreement entered into by two or more States or local governments;
- a membership organization in which a State or local government is a member; or
- an institution of higher education designated by a State or local government.

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* This term is defined by 10 U.S.C. § 2491(9).

Other participants the Regional Technology Alliance deems necessary for the effort may also be included. Regional Technology Alliances that include a large number of participants from outside the region defined in the proposal should explain clearly why those participants are needed to carry out the project (i.e., why this project is a region-based RTA proposal rather than a Technology Development proposal).

4.5 Cost Sharing Requirements

Funding for the Regional Technology Alliances competition is appropriated under 10 U.S.C. §2513. The estimated funding available is shown in the table below.

Statutory Program	Estimated FY1995 Funding	Minimum Alliance Share of Costs		
		Year 1	Year 2	Years 3-5
Regional Technology Alliances	$115M	50%	50%	50%

4.5.1 Cost Sharing General Principles

A general test for constructing your contribution should consider the following:

a) Is the resource under the control of or used by the Alliance (not by an individual Alliance member)? If so, does it actually help with the project or, stated another way, is it germane to the overall statement of work?

b) What is the fair market value of that resource?

c) Generally, contributions by non-TRP Federal Government entities are neutral with regard to cost sharing requirements, counting neither as Government nor participant contribution.

Contributions not allowed as part of cost share include foregone fees and profits on the proposed TRP program; costs previously incurred (e.g., past expenditures to develop technology or intellectual property—but use of previously-developed intellectual property may be a valid contribution if it meets the criteria for in-kind contributions), and cost of work done on past or concurrent Government contracts.

4.5.2 Cost Share Classifications

Cost share is classified as either cash or in-kind as follows:

4.5.2.1 Cash

(a) Cash contributions are outlays of funds to support the total project through acquiring material, buying equipment, paying labor (including benefits and direct overhead associated with that labor), and other cash outlays required to perform the statement of work. Independent Research and Development (IR&D) funds from a non-TRP Government contract (see FAR 31-205-18(e)) are considered by the TRP to be the proposers' own funds and may be used as a source of cash for TRP projects, even though they remain eligible for reimbursement by the Government. Cash can be derived from any source of funds within the participating partners' accounting systems. Cash also can be derived from outside sources, such as donations from state or local governments or funds from venture capitalists.

(b) A participant's cash contribution may include revenues from any non-Federal source, including non-Federal contracts or grants. Profit or fee from a Federal contract (other than the proposed TRP project) may also be included. Under certain

circumstances, Federal SBIR and STTR funds may also count as cash, as described below.

4.5.2.2 In-Kind

a) In-kind contributions are the reasonable value of equipment, materials, or other property used in the performance of the statement of work. Generally, in-kind contributions are hard to see and value (such as space or use of equipment) and intellectual property (technology transfer activities). In particular, when proposing intellectual property for in-kind cost share, the offeror should consider the following: Is its use central to the project; is it a real or incidental resource; what is the fair market value of the intellectual property as it is actually used on the project?

b) Previously-developed intellectual property may be included in a participant's contribution subject to an evaluation of its value to the Alliance's proposed efforts and a limit of its value to no more than the Alliance members' prior investment in the proprietary technology involved.

c) The in-kind value of equipment (including software) shall not exceed its fair market value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

d) The in-kind value of space (including land or buildings) shall not exceed its fair rental value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

The TRP Regional Technology Alliances competition includes the quality of cost share (other than that to be provided by small business—see Section 4.6.3.1, below) as part of its evaluation of proposers' commitment to use the results of the TRP-funded project.

4.5.3 Special Provisions for Small Business

4.5.3.1 Additional Time To Secure Cost Share

As part of the Fiscal Year 1995 Defense Department Authorization, Congress sought to increase the participation of small business concerns in the TRP Regional Technology Alliances Competition Area by providing them with additional time to obtain the minimum 50% required cost share:

In order to implement this language, evaluation of proposals in the Regional Technology Alliances Competition Area will assume that cost share offered by any small business concern is of highest quality and will be available to the proposing Alliance. Once an Alliance's proposal including small business cost share is selected for negotiation leading to possible award, Alliance participants will have an additional 120 days to provide acceptable documentation of the availability (from sources other than persons of a foreign country) and quality of the proposed cost share. If the Alliance cannot provide such documentation or, alternatively, restructure the proposal's cost sharing so that it meets the statutory requirements without the proposed small business contribution, then the TRP may revoke the selection of the proposal and discontinue negotiations with the Alliance.

4.5.3.2 Use of SBIR and STTR Funds as Non-Federal Cost Share

A small business participant's cost sharing contribution in a TRP project may include funds received under a Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) contract. This can be the case whether the SBIR or STTR was awarded by the

TRP or by some other agency. The SBIR or STTR effort must meet one of two tests if its funding is to be counted as cost share. Either:

- The work to be done (under the SBIR or STTR agreement) is clearly identified ("embedded"—see below) in the TRP proposal as part of the overall TRP project and integral to the proposed TRP effort; or
- If not integral to the TRP proposal, the work to be done under the SBIR or STTR project is clearly related to the work being performed under the TRP agreement and capable of being integrated into that effort.

Unexpended SBIR or STTR funds that remain available **at the TRP proposal due date** may be counted as cost share in the event your proposal is selected by the TRP. Note that funds expended after the proposal due date but before the commencement of work under the TRP agreement may be counted as cost share.

Funds expended prior to the FY95 TRP proposal due date will not be considered cash but may be considered as an in-kind contribution to cost share. Offerors should refer to Section 4.5.2.2 for more information about in-kind contributions.

It is a statutory requirement prerequisite to the counting of SBIR or STTR funds as cost share that the small business offering these funds must participate in the TRP project at a level of contribution and participation sufficient to demonstrate a long-term financial commitment to the product or process development involved in the TRP project that is comparable to the commitment of the other non-Federal participants on the team.

As described above, small businesses can associate with partners and "embed" or incorporate a Phase I effort into a TRP proposal. The funds received from the SBIR effort could contribute $99,000 of the TRP cost share requirement if the TRP proposal and its "embedded" SBIR proposal are both selected.

TRP proposals that include an embedded SBIR proposal must include a brief discussion of the SBIR effort within the technical discussion of the TRP proposal itself. This discussion should include a description of the SBIR project objectives and the relationship and relevance of the SBIR effort to the overall objectives of the proposed TRP effort. The anticipated cost share gained from the inclusion of the SBIR effort must be noted under the "Other" category in the cost section of the TRP proposal. The SBIR proposal, describing the proposed effort in detail, must be prepared in accordance with standard SBIR program requirements and submitted separately from the TRP proposal.

4.6 Selection Criteria

The following selection criteria are for the Regional Technology Alliances Competition Area only and incorporate all the statutorily-required selection criteria. Each proposal must address these six selection criteria, which are equally weighted: regional merits, technical merit, management approach, commitment to commercial use, Defense relevance, and impact to the region.

4.6.1 Regional Merits

- The degree to which the economic activity, technology sources such as Federal laboratories and institutions of higher education, and other resources and organizations in the RTA's region make it more likely that the proposed project will lead to an improved dual-use technical capability.

4.6.2 Technical Merit

- The technical soundness and quality of the proposed project.
- The improvement created by the proposed project over existing technical capabilities.
- Feasibility of the proposed project consistent with cost, including the appropriate mitigation of risk.

4.6.3 Management Approach

- The quality of plans for the proposed project's organizational structure, staffing, and management.
- Adequacy of resources for the proposed project.
- The quality, experience, and appropriateness of RTA members.
- The degree to which RTA members' capabilities are complementary, including the appropriateness of each member's role, particularly that of the "sponsoring agency."

4.6.4 Commitment to Commercial Use

- Commitment shown by RTA members to use the improved technical capability in their commercial business operations. This includes an assessment of their direct involvement in the proposed project, acceptance of risk through the contribution of private sector resources, and future plans.

4.6.5 Defense Relevance

- The degree to which the project will directly lead to clear improvements in products and processes used or needed by the DoD, including improvements in cost, performance, availability, and reliability.

4.6.6 Impact to Firms in the Region.

- The prospect for the proposed project to have a lasting, beneficial impact upon firms in the region, particularly small and medium sized firms.
- Clarity and magnitude of the commercial competitive advantage created by the proposed project.

4.7 Proposal Instructions

Regional Technology Alliances proposers shall prepare a technical proposal and a cost proposal according to the following formats and responding to the above selection criteria.

4.7.1 Proposal Page Formats

The technical and cost proposal page count shall include every page, including pages that contain words, table of contents, executive summary, management information and qualifications, resumes, figures, tables, and pictures. All proposals shall be printed such that pages are single-sided, with no more than fifty-five (55) lines per page. Use 21.6 x 27.9 cm (8 1/2" x 11") paper or

A4 metric paper. Use an easy-to-read font of not more than about 5 characters per cm (fixed pitch font of 12 or fewer characters per inch or proportional font of point size 10 or larger). Smaller type may be used in figures and tables, but must be clearly legible. Margins on all sides (top, bottom, left and right) must be at least 2.5 cm. (1").

4.7.2 Technical Proposal Format

Technical proposals shall be a maximum of forty (40) pages. The following five (5) sections shall comprise the forty pages:

4.7.2.1 Section 1—Executive Summary

The Executive Summary shall provide a brief description of the proposed Regional Technology Alliance's activity. It should reflect that the Alliance has thought through the potential business, market, and economic implications if the technical goals of the project are achieved. The enhanced regional dual-use industrial capabilities anticipated from the RTA's activity should be clearly stated, along with the lasting, positive benefit that will accrue to firms in the region after TRP support for the project has ended.

4.7.2.2 Section 2—Body of the Proposal

This section of the proposal shall give a detailed explanation of the technical approach, planning, merit and benefits to be derived from the proposed Regional Technology Alliance's activities. This section should address all technical aspects of the proposed project as they relate to the selection criteria for Regional Technology Alliances.

4.7.2.3 Section 3—Statement of Work

A Statement of Work will be supplied that discusses the specific tasks to be carried out, including a schedule of significant events and measurable milestones.

4.7.2.4 Section 4—Selection Criteria Index

A one-page index showing the pages on which each of the selection criteria is addressed is required.

4.7.3 Cost/Funding Proposal Format

Cost/funding proposals are limited to fifty (50) pages in length, have no specific page layout requirements, and shall address funding periods of performance as described below. Work Breakdown Structures or certified cost or pricing data are neither required nor desired.

Cost/funding proposals will be organized to include four sections in the following order: total project cost, cost sharing and in-kind contributions, cost to the Government, and off-budget supporting resources.

4.7.3.1 Section 1—Total Project Cost

This section will give a detailed breakdown of costs of the project. Cost should also be broken down on a task-by-task basis for each task appearing in the Statement of Work. This must include all of the Cost to the Government and Cost Sharing.

The following information should be presented in your proposal for each phase of the effort: total cost of the TRP project; total contribution proposed by the consortium; total proposer cost share; funding requested from TRP; and Elements of Cost (labor, direct materials, travel, other direct costs, equipment, software, patents, royalties, other costs, indirect costs, cost of money or profit). Sufficient information should be provided in supporting documents to allow the

Government to evaluate the reasonableness of these proposed costs, including salaries, overhead, equipment purchases, fair market rental value of leased items, and the method used for making such valuations.

4.7.3.2 Section 2 —Cost Sharing and In-Kind Contributions

This section will include: (1) the sources of cash and amounts to be used for matching requirements, (2) the specific in-kind contributions proposed, their value in monetary terms, and the methods by which their values were derived, and (3) evidence of the existence of cash or commitments to provide cash in the future. Affirmative statements are required from outside sources of cash.

Proposals should contain sufficient information regarding the sources of cost share so that a determination may be made by the Government regarding the availability, timeliness, and control of resources. How will the funds and resources applied advance the progress of the proposed effort? What is the role of any proposed in-kind contributions?

The TRP Regional Technology Alliances competition includes the quality of cost share as part of its evaluation of proposers' commitment to commercialize and productize the results of the Alliance efforts.

4.7.3.3 Section 3—Cost to the Government

This section will specify the total costs to be borne by the Government and any **technical or other assistance including equipment, facilities, and personnel of Federal laboratories** required to support these activities. The Cost to the Government should be that portion of the proposed effort which is not covered by your cost share.

Proposals should contain sufficient information regarding the resources to be provided by the Government so that an evaluation of their availability, timeliness, and control may be made.

4.7.3.4 Section 4—Off-Budget Supporting Resources

This section will show cash or in-kind resources which will support the proposed activity, but which you do not intend to include in the total project cost. Items in this category do not count as cost share nor as Federal funds which must be matched.

Examples of items to place in this category include: Commitments of cash or in-kind resources from other Federal sources, such as Federal funds or Federally-funded contributions of national laboratories; and, projections of fee-based income where there is substantial uncertainty about the level which will actually be collected, and where the income is not needed to meet cost-share requirements.

4.7.4 Additional Proposal Considerations

4.7.4.1 Term of Awards

Regional Technology Alliances proposals should include budgets with a base term of 12 to 24 months with optional additional terms of 12 to 24 months each. The Government may fund both base term and options from the present appropriation depending on the content of the proposal, the availability of funds, the fit with other programs, and any other considerations necessary to establish and maintain program coherence and balance. The Government may also choose to condition the exercise of options on the availability of future year appropriations or other funding sources.

4.8 Submission of Concept Papers

TRP will accept and review "Concept Papers," summarizing the project that is to be the subject of a proposal, from prospective proposers. The purpose of these Concept Papers is to improve the overall selection rate for this competition. Submitters of Concept Papers should use feedback from this process to make their own decision on whether to prepare a full proposal. It is TRP's goal in using Concept Papers to discourage full proposals from submitters whose proposal concept would have a low probability for funding and to provide constructive feedback to those proposers whose ideas have a better likelihood of success.

Specific recommendations made by TRP in response to a Concept Paper are advisory in nature ONLY. Further, proposers who do not submit a Concept Paper are permitted to submit a full proposal in response to the formal solicitation. REGARDLESS OF THE OUTCOME OF THE TRP'S EVALUATION OF YOUR CONCEPT PAPER, YOU MUST LATER SUBMIT A FULL PROPOSAL IN ORDER TO BE CONSIDERED IN COMPETITION FOR RECEIVING A TRP AWARD.

4.8.1 Format

The RTA Concept Paper must be no more than 5 pages long, excluding cover sheets.* Any additional pages, including resumes or supporting documents, will not be reviewed. While it is understood that all details of a concept or proposal will not be fully developed, the Concept Paper should provide enough information to permit an adequate review against the published criteria. Emphasis should be placed on explaining the technical merit of the concept and demonstrating the impact to Defense and the existence of a viable commercial market. Planned partnerships and cost sharing should also be discussed, but it is understood these will be less developed.

4.8.2 Concept Paper Review and Feedback

It is anticipated that feedback to submitters will be in the form of a qualitative rating of the Concept Paper for each of the selection criteria and guidance that will assist proposers in the decision about whether to submit a full proposal.

TRP cannot guarantee that the review of a five-page Concept Paper will correlate exactly with the evaluation of a full proposal. This process is intended as guidance only.

4.8.3 Schedule

Concept Papers must be received by 4:00 PM on December 21, 1994. They should be sent or delivered (to the 8th floor mail room) to the following address:

Technology Reinvestment Project
Advanced Research Projects Agency
3701 N. Fairfax Drive
Arlington, VA 22203-1714

A Concept Paper received after the exact time specified for receipt will not be considered unless: (a) it was sent by registered or certified mail not later than December 16, 1994 or by U.S. Postal Service Express Mail Next Day Service-Post Office to Addressee on or before 4:00 PM at the address of mailing on December 19, 1994 or (b) it was sent by mail and it is

* A sample cover sheet appears at the end of this PIP, following Appendix A.

determined by the Government that the late receipt was due solely to mishandling by the Government after receipt at the Government installation.

Concept Paper review is expected to take approximately 3 weeks, with feedback letters mailed within two weeks after that. TRP will not provide any interim feedback, nor will TRP provide any results ahead of this schedule.

TRP will make every effort to meet this evaluation schedule, but the actual schedule will depend on the number of Concept Papers received. **However, the formal solicitation for this competition will not be published until one week after the mailing of the last Concept Paper review.**

5. MANUFACTURING EDUCATION AND TRAINING COMPETITION AREA

5.1 Background

Manufacturing covers a wide range of technologies and concepts, and encompasses the full spectrum of materials, products and processes upon which the American industrial enterprise is based. In the context of the Manufacturing Education and Training (MET) competition, manufacturing includes the full range of economic activities from chemical and biotechnology processing to electronic component and system fabrication, durable goods production, fabrication of structures, and other manufacturing sectors.

Activities sought in the MET Competition Area should focus on upgrading individual skills with the aim of producing a world-class, flexible workforce that will function effectively under both Defense and commercial production regimes. They should also focus on providing the highly-skilled, flexible, technical workforce of the future.

TRP MET activities will provide Defense and commercial engineers and technicians with improved knowledge of engineering, science, and mathematics so that they may more effectively contribute to the global competitiveness of U.S. industry. Emphasis will be on dual-use engineering skills and business knowledge. Activities will target the improvement of curricula and educational tools at universities, colleges, community colleges, technical and vocational schools, and pre-college educational institutions, and will emphasize partnerships among these educational institutions. Activities that place special emphasis on skill conversion for engineers, technicians, and other professionals displaced by the Defense draw-down are encouraged.

5.1.1 Necessary Proposal Elements

Proposals in MET must address all of the following considerations in order to meet statutory requirements and to score well on the TRP selection criteria:

Cross-Sectoral Partnerships: TRP MET activities seek teaming arrangements across academe and between academe and industry. It is envisioned that educational institutions at various levels will combine their respective perspectives on education to fulfill the vision of the TRP, working with personnel from industry.

The Role of Industry: Industry personnel are expected to be integral members of the proposing teams and to be actively involved in providing input needed for educational improvements, in classroom activities, and in student mentoring. Firms are encouraged to provide on-site manufacturing experience for students. **TRP statutes require cost sharing at least equal to the annual level of Federal government support by the end of each year. Industry is expected to contribute to the provision of this required cost share.** This contribution may include cash (including compensated personnel time) and in-kind support such as contributed equipment and facilities. Academic and other non-federal sources are also expected to contribute to the non-Federal share of costs.

Diversity of Participants: Proposers should strive to involve students who represent the diversity of the U.S. population and a diverse group of firms in terms of size and involvement with defense and civilian production.

Manufacturing Experts in the Classroom: Proposers are encouraged to bring into the classroom industrial personnel who have experience with state-of-the-art manufacturing equipment and new approaches to manufacturing that integrate the design, production, and engineering workforces into a team.

Post-Award Oversight: Awards will generally be cooperative agreements or grants, and periodic reviews will be held to assess progress and to assist in smooth and effective program development.

Proposals should represent team efforts between academe and industry. Including state government in these teams is also welcome. All awardees are expected to assume a responsibility for implementation, assessment, and dissemination. Awardees will be expected to develop a data base of indicators of progress and outcome under TRP guidance.

MET proposals will be sought from the following Focus Areas. It is anticipated that $30 million will be available for this competition.

- Educational Traineeships for Defense Industry Engineers
- Retraining the Manufacturing Workforce
- Practice-Oriented Master's Degree Programs
- Engineering Education in Manufacturing Across the Curriculum
- Manufacturing/Technical Education for Pre-College Students
- Other Innovations in Manufacturing Engineering Education.

5.1.2 Tentative Schedule

The following is the planned schedule for the MET Competition Area:

Publication of Announcement in Commerce Business Daily (CBD):	October 21, 1994
Outreach Period:	October 21, 1994 - February 3, 1995
Publication of Solicitation:	February 3, 1995
Due Date for Proposals:	March 17, 1995
Publication of Selections:	May 1995
Completion of Negotiations:	September 1995

5.1.3 TRP Outreach Activities

The TRP plans to conduct a variety of outreach activities around the United States for Manufacturing Education and Training up until February 3, 1995. Information about TRP-related meetings, publications, and other outreach activities can be obtained by calling the TRP at 1-800-DUAL-USE.

Each state has identified a point of contact to provide additional coordination and information for companies within the state wishing to participate in TRP. Activities sponsored by a state may include networking opportunities, proposal workshops, or development of a partnering database. Although the TRP staff in Washington coordinates some activities with these representatives, it is important to note that the TRP cannot endorse state policies and selection criteria as part of the TRP process. A list of the state representatives, as provided to the TRP, appears in Appendix A.

5.1.4 TRP MET "Lessons Learned"

As a rule, proposals selected in the 1993 TRP competition were well-focused, well-organized and specific, had clear objectives and sufficient detail, and conveyed the promise of significant impact. They also addressed the published selection criteria in a clear and focused way. In terms of contents, they articulated innovative and realistic approaches. Furthermore, they

showed clear linkages between innovative ideas and TRP goals and included action plans involving recognized experts in manufacturing with specified outcomes.

True industrial involvement and strong commitment were essential in winning high praises from the evaluators. Emphasis will continue to be placed on forming cross-disciplinary and cross-sector partnerships. However, it is important to articulate the value added to the proposal by such partnerships. Simply grouping entities together to achieve a certain size or team composition without intellectual synergism tends to have a negative effect on the evaluators.

Despite the thoughtful effort that had gone into estimating or anticipating the sizes of different kinds of projects in the previous announcement, some proposers found the prescribed budgetary limits to be constraining. None are specified for the current competition. It is up to the proposers to present and justify the most appropriate budget commensurate with the tasks to be undertaken. Highly rated projects in the previous competition generally proposed reasonable and realistic budgets.

All proposers are once again reminded of the dual-use emphasis of the program. Those with concrete plans to involve active or displaced Defense personnel in upgrading or life-long learning toward more versatile skills spanning Defense and civilian technologies are likely to fare well against the selection criteria.

5.1.5 TRP Funding Instruments

TRP recognizes that the typical Government procurement contract cannot provide the flexibility that is needed in the R&D environment. In the TRP environment it is often difficult to state the tasks to be performed with great specificity. Extensive involvement of government personnel is often required, and the sharing of costs is required. Flexibility in the allocation of rights to intellectual property (patents, trademarks, copyrights, trade secrets) may be necessary to induce participation, particularly by companies from the for-profit sector who have no prior experience as Government contractors.

Because contracts—more precisely, procurement contracts—are properly used only when the primary purpose is to acquire supplies and services for the direct benefit of the Federal Government, not to advance the state of the art, improve the technology base, demonstrate the feasibility of a new technology, or meet one or another of the objectives of the TRP, it is anticipated that no procurement contracts will be used for TRP programs except as may be required for SBIR projects.

Government-sponsored research efforts typically use grants and cooperative agreements when the purpose of the effort is to transfer something of value to a recipient to support and stimulate R&D for some public purpose. Government funding is more in the nature of an investment than a purchase in such situations. A grant is appropriate when the degree of involvement of the government agency is not expected to be substantial; substantial government involvement calls for a cooperative agreement instead. In both cases, the usual procurement contract regulations generally do not apply, so there is some flexibility to tailor the agreement to meet the needs of the participants.

"Other transactions" are just that—any form of transaction that is not a grant, contract or cooperative agreement. These may include (but are certainly 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.

Most TRP awards in the Manufacturing Education and Training Competition Area will result in grants, cooperative agreements or other transactions. The contracting authorities and policies of the six TRP agencies are not all the same. Different agencies have different contracting authority under their organic statutes and under the regulations which govern their operations.

While this discussion of funding instruments is based on ARPA's authority, it is applicable, for the contracting practices in order to meet the needs of TRP awardees insofar as possible under their statutes and regulations.

5.1.6 Limitations on Foreign Access to TRP-Funded Technology

The Department of Defense Authorization Act for Fiscal Year 1995 includes a statutory condition on the funding of TRP projects that "the principal economic benefit of, and, to the extent practicable, the job creation resulting from [TRP projects] accrue to the economy of the United States." This philosophy was a cornerstone of TRP policy before its enactment by Congress. In keeping with both philosophy and legislative directive, TRP agreements include a provision requiring the participants to disclose to the Government certain forms of transfers of technology to foreign entities and to obtain permission prior to implementing such transfers. The controls contemplated in this provision are in addition to, and do not change or supersede, the provisions of the International Traffic in Arms Regulation (22 CFR pt. 121 et seq.), the DoD Industrial Security Regulation (DoD 5220.22-R) and the Department of Commerce Export Regulation (15 CFR pt. 770 et seq.)

Transfers governed by this provision include the sale of a company, and sales or licensing of technology. The notice and approval requirement does not apply, however to:

- sales of products or components, or
- licenses of software or documentation related to sales of products or components, or
- transfers to foreign subsidiaries of TRP alliance participants for purposes related to the TRP project, or
- transfers which provide access to technology to a foreign firm or institution which is an approved source of supply or source for the conduct of research in the TRP project provided that such transfer shall be limited to that necessary to allow the firm or institution to perform its approved role in the TRP project.

5.1.7 Historically Black Colleges and Universities and Minority Institutions

Historically Black Colleges and Universities (HBCU's) and Minority Institutions (MI's) are encouraged to participate as team members in the Manufacturing Education and Training Competition Area. In any case in which the evaluation of two or more proposals is substantially equal, preference for award will be given to those proposals which include HBCU's and MI's as participants over those which do not include an HBCU or MI.

5.2 MET Focus Areas

This Section describes Focus Areas for the MET Competition Area. Each proposal must be directed at one of these Focus Areas. It is to the proposers' advantage to carefully and specifically address the elements of the Focus Area description in developing their proposals.

The examples given are for guidance only. While they describe projects appropriate to each Focus Area, many other kinds of efforts are likely to be equally (or possibly even more) appropriate.

5.2.1 Educational Traineeships for Defense Industry Engineers

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The purpose of this Focus Area is to provide an opportunity for Defense engineers to gain short-term training to upgrade their technical skills and perspectives for greater productivity and flexibility. Defense industries employ a large number of highly skilled engineers who can benefit from a reorientation of their education toward dual-use manufacturing. University, college, community college, or vocational/technical college engineering or engineering technology programs for education in manufacturing may receive funding for traineeships to support current or recently unemployed (within the last two years) Defense industry engineers to pursue educational programs focused on dual-use capacity. These traineeships may support special non-degree programs of study, such as a technical upgrade, or undergraduate or advanced degrees in manufacturing. Each educational institution will provide a group of students with full- or part-time support that is expected to cover tuition and living costs. Some funds may be used to develop special educational tools or materials more suitable for adult populations with practical experience in the workforce, and career selection and job placement services. Team teaching, mixing academic and industrial personnel, is encouraged.

It is anticipated that three-year awards will be made. No renewals are anticipated at this time. The level of funding proposed should be commensurate with the scale and complexity of the project proposed. The institutions of higher education, industry, and other sources are expected to bear at least 50% of the costs of the program (on an annual basis) with cash and in-kind contributions. This cost sharing can include the compensated time that industrial and other personnel spend at the educational institution(s). Industry personnel should become actively engaged in curriculum development and teaching.

Sample Activity: University GHI requests a three-year award to offer fellowships to current or recently unemployed Defense industry engineers to pursue educational programs at the university. The university will develop a special program that includes refresher or remedial courses in engineering science and mathematics for students who are returning to pursue academic degrees, waive requirements for academic courses that duplicate demonstrated engineering experience gained on the job, and develop focused modules that train the engineer in emerging fields of manufacturing, such as biotechnology or environmentally-conscious manufacturing. The industry share of costs includes fellowship funds and the compensated time of industrial personnel involved in curriculum development and in team teaching classes, laboratories, and seminars at the university.

Sample Activity: Community College RMI and Technical College PQR join to request a three-year award to offer fellowships to current or recently unemployed Defense industry engineers to pursue educational programs using the advanced manufacturing equipment available at the two colleges. They will develop a special program that includes refresher and remedial courses in engineering science and mathematics for students who are returning to pursue academic degrees, waive requirements for academic courses that duplicate demonstrated engineering experience gained on the job, and prepare special training modules that update their knowledge of state-of-the art manufacturing technology. The industry share of costs includes fellowship funds and the compensated time of industrial personnel involved in curriculum development and in the team teaching of classes, laboratories and seminars at the colleges.

5.2.2 Retraining the Manufacturing Workforce

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The purpose of this Focus Area is to develop local educational/industrial teams focused on innovative approaches to workforce training. This activity requires a partnership including both educational institutions and industry to achieve its goals. TRP will provide funds to develop, test and implement innovative educational tools and curricula. In retraining the manufacturing workforce, the partners will integrate their respective capabilities to enhance the skills of the trainees in the areas of design and production of manufactured goods. Special emphasis will be placed on areas of manufacturing with dual-use potential and the involvement of small, medium, and large firms.

Proposed efforts should be focused on developing and testing courses, course modules, alternative teaching/learning methods, and materials that are appropriate for adult populations. The effort should focus on making appropriate-scale production equipment available for instruction, and the development of new educational tools for production workforce education. Funds can be used for developing instructional laboratories that provide experience with state-of-the art computer instructional materials and production equipment. Effective utilization of Defense facilities scheduled for conversion to civilian use and conversion of instructional techniques and materials proven effective for military workforce training are acceptable components of projects in this Focus Area.

Proposers are expected to develop innovative approaches to meeting the need for manufacturing workforce retraining. Industry should participate fully and provide cross-firm teaching and learning opportunities. The teams should make effective use of university or college-level engineering and engineering technology programs to bring their knowledge of engineering fundamentals and computational skills to bear on the training needs. The teams also are expected to make use of community college faculty and facilities that are already geared to workforce education and vocational/technical education programs at all levels. Creative approaches, such as long-distance learning technology to broadcast courses to the workplace, are encouraged. Teams may also choose to offer manufacturing engineering courses at industrial sites as part of a coordinated university/industry educational effort, target special educational approaches and materials more suitable for adult populations with practical experience in the workforce, and provide career selection and job placement services.

The lead institution must be an institution of higher education focused on post-secondary education. The educational partners representing four-year education programs may be from college or university-level programs in one or more of the following: engineering, engineering technology, mathematics, materials science, and other engineering-relevant disciplines. The partnership should also include one or more community colleges or technical or vocational institutions. Partnerships may also include, but may not be led by, technical and vocational programs in high schools. It is generally expected that there will be more than one industrial partner. However, if there is only one such partner, justification should be provided as to how the benefit accrues to more than that firm.

It is anticipated that three-year awards will be made. No renewals are anticipated at this time. The level of funding proposed should be commensurate with the scale and complexity of the project proposed. The institutions of higher education, industry, and other sources are expected to match the TRP award with cash and in-kind contributions on an annual basis. This cost sharing can include the compensated time that industrial and other personnel spend at the educational

institution(s). Industry personnel should become actively engaged in curriculum development and teaching.

Sample Activity: University RHW, Community College HLB, and Technical College DJR have developed a joint proposal to implement a regional center to upgrade the skills of the industrial workforce in the quad-city region, a significant area of concentration of medium to large Defense-oriented firms. The proposal upgrades the existing curriculum and training facilities of the community college and the technical college and augments them by expanding the direct-broadcast, interactive television instructional system of the university. The university engineers from engineering and engineering technology programs work in collaboration with the other partners to infuse the teaching materials with state-of-the art knowledge of manufacturing and manufacturing technology. The community college and technical or vocational education partners contribute their knowledge of learning styles, state-of-the-art teaching tools, and needs of the shop floor workforce. The effort will offer degree and short course programs, on-site in industry, at locations provided by individual companies, and it will be open to all local companies and to students matriculated in the participating educational institutions. The industry cost share includes funds for supplies and equipment, the fair rental value of industrial facilities used for instruction, and compensated time of industrial personnel for teaching classes, workshops and seminars.

5.2.3 Practice-Oriented Master's Degree Programs

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The purpose of this Focus Area is to provide an opportunity for academe to develop and implement new master's degree programs that are focused on the practice of manufacturing, with an emphasis on dual-use manufacturing capability. In many universities, the master's degree has evolved into a preparatory degree for doctoral studies. There is a need for a range of intellectually rigorous master's programs to prepare graduates for the integrated process of making things in practice.

TRP will provide support to develop, test and implement the curricula and practice-oriented laboratories needed for such programs. Experienced engineers from Defense firms or national laboratories will return to the university to be among the student body pursuing these degrees. Students should be given on-site industrial experience as a part of the degree program. They should be exposed to practice-oriented teaching/learning laboratories that include up-to-date manufacturing equipment. Some funds could be used to develop special educational approaches and materials more suitable for adult populations with practical experience in the workforce, including those developed by the military. Some funds may also be used for career selection and job placement services.

Three-year awards will be made. No renewals are anticipated at this time. The level of funding proposed should be commensurate with the scale and complexity of the project proposed. The institutions of higher education, industry, and other sources are required to provide cost share equal to the TRP award on an annual basis in cash and in-kind contributions. This cost sharing can include the compensated time that industrial and other personnel spend at the educational institution(s), and in other in-kind contributions. Industry personnel should become actively engaged in curriculum development and teaching.

Sample Activity: University MSN requests a three-year award to develop a program that allows master's degree candidates to pursue case-study-based master's theses in cooperation with a network of fifteen local industrial companies. The theses will be jointly supervised by university faculty and industrial experts and will concentrate on the application of basic engineering science to the solution of actual industrial manufacturing problems. The industry cost share includes funds for supplies and equipment, use of specialized industrial facilities for experimentation and prototyping, and compensated time of industrial personnel for teaching classes, workshops and seminars. The program is supported by a new curriculum that includes a design/prototype laboratory and an instrumentation laboratory that can be used by students in the program to breadboard solutions before presenting their ideas to industry. Industry has provided equipment to help equip these labs, the fair market value of which contributes to cost share. A special program is developed to aid students in job placement.

5.2.4 Engineering Education in Manufacturing Across the Curriculum (Universities, Colleges, or Community Colleges)

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The purpose of this Focus Area is to provide support for the development and implementation of comprehensive educational programs that will provide manufacturing education and experience for a broad range of engineering disciplines in order to produce a world-class manufacturing workforce for the future. Engineering education and practice are based on a balance among analysis, design, processing, and integration. Typical engineering curricula excel in the teaching of analysis and analysis-based design but fail to adequately educate students in the skills and perspectives needed to synthesize and integrate knowledge and to integrate design with practical manufacturing-related considerations for cost-effective and competitive production. This latter "education" typically has been the responsibility of industry and has taken place during the first years of employment. The aim of this initiative is to integrate this industry-based manufacturing experience into engineering curricula at the undergraduate level, with the full cooperation and participation of industry.

The TRP invites proposals for comprehensive, integrated programs in undergraduate engineering education in manufacturing that cut across appropriate engineering disciplines. These may be from university, college, or community college engineering programs. Linkages to vocational/technical institutions for access to state-of-the-art manufacturing equipment are possible. The lead institution of each proposal team should have a demonstrated capacity in manufacturing research or education with a record of active industry/university collaboration. The proposing team will involve industry and academic personnel. It may be led by the Dean of Engineering or other person responsible for all engineering programs or may be led by a faculty member, in which case the proposal must be endorsed by the Dean of Engineering or the person responsible for all engineering programs. Proposals should involve a breadth of departments in the engineering or engineering technology programs, make the best use of cross-disciplinary manufacturing centers and may involve non-engineering disciplines, such as management, mathematics and statistics, and the social sciences, and computer science, as appropriate. Proposals with innovative approaches and the potential to create models for wide-spread adoption across the nation will be particularly attractive.

TRP funds and team cost share may be used for the development of curricula and related courses, their implementation and assessment, teaching/learning laboratories for hands-on manufacturing experience, and manufacturing simulation and other manufacturing educational software. Some support is available to conduct research that supports curriculum development and instruction and is likely to improve manufacturing engineering and technology in these educational programs.

Three-year awards will be made. No renewals are anticipated at this time. The level of funding proposed should be commensurate with the scale and complexity of the project proposed. The institutions of higher education, industry, and other sources are expected to share the cost of project activities with TRP on an annual basis with cash and in-kind contributions. This cost sharing can include the compensated time that industrial and other personnel spend at the educational institution(s), and in other in-kind contributions. Industry personnel should become actively engaged in curriculum development and teaching.

Integrated proposals, which include several complementary activities, are particularly encouraged. Examples of proposals which would fit under this Focus Area are presented below but should not be seen as intended to limit the scope of ideas proposed.

Sample Activity—Manufacturing-Related Design/Manufacturing Experience: Curricula could be developed to integrate design and manufacturing within the undergraduate experience. Students could be involved in limited-scale design and production teams. Manufacture of student products could occur either in industrial facilities or in upgraded university teaching laboratories.

Sample Activity—Synthesis-Based Problem Solving: A large component of problem-solving in manufacturing is the identification of relevant problems in other domains of application and the synthesis of analogous solutions in the problem area under study. Broadly-based seminar courses which present current production techniques and future challenges of key manufacturing industry components are one possible way to expose students to a wide range of industry experience. The seminars could be completed with student projects in which the principles illustrated in the seminars are applied to the conceptual design of a manufacturing student. The use of guest speakers from industry and a strong mix of high technology and traditional manufacturing situations are desirable.

Sample Activity—Software Tools for Education and Manufacturing: Common software usage in education and practice provides a common medium for communication. Universities have a great potential for developing manufacturing simulations and other software as teaching tools. Some may have potential for transfer of manufacturing simulation capability to industry through a common software link, as well. The common software link may allow the real-world problem solutions to feed back into the curriculum, often complete with the industry experts that solved them as guest lecturers. Ideally, these systems should integrate design and manufacturing as a part of the learning experience for a range of engineering disciplines.

Sample Activity—Undergraduate Manufacturing Teaching/Learning Laboratories: Students can benefit from hands-on experience in manufacturing teaching/learning laboratories where they have the opportunity to use industrial processes and make products. Support may be provided to develop or enhance such laboratories to complement the comprehensive, integrated program across the engineering disciplines.

5.2.5 Manufacturing/Technical Education for Pre-College Students

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The purpose of this Focus Area is to provide support for the development of educational innovations in technical/manufacturing education for elementary and secondary students, linking them to institutions of higher education focused on manufacturing education. This activity aims to introduce manufacturing as an exciting field and to interest capable students in manufacturing as a career while they are in their early educational years. To strengthen the quality of the future workforce in the U.S., educational institutions need to provide students with hands-on experience that will bring their natural curiosity and talents to bear on designing and making things to solve problems amenable to technical solutions.

This activity invites post-secondary institutions of higher education to join with pre-college educational institutions to develop educational innovations that will provide pre-college students with an early experience in designing and making things. Through this effort, students with technical capability may gain this type of experience while they are young to capture their interest and provide a pathway for them to gain post-secondary education to fulfill these capabilities.

This effort aims to join institutions of higher education with elementary and secondary educational institutions to focus on technical education at all levels. It is required that an institution of higher education be in the lead to provide an effective transition for these students to higher levels of technical education. The pre-college educational partners may be individual schools, public or private, as well as whole school systems.

These educational institutions are invited to propose innovative approaches to technical education at any level of the pre-college K-12 continuum. Proposing teams are encouraged to infuse pre-college science education with knowledge of how science leads to technology and how computational skills, design, engineering knowledge, and manufacturing are the keys to the realization of ideas in products. Proposers are encouraged to develop educational programs that will integrate science with hands-on experience through shop and other laboratory experience leading to the making of things. Proposers are encouraged to bring engineers from industry into the classroom at all levels—as new faculty, visiting teachers, or adjunct faculty. Proposers are encouraged to develop educational materials such as course modules, texts, and software to accompany these efforts.

It is anticipated that three-year awards will be made. No renewals are anticipated at this time. The level of funding proposed should be commensurate with the scale and complexity of the project proposed. The institutions of higher education, industry, and other sources are expected to match the annual level of the TRP award in cash and in-kind contributions. This cost sharing can include the compensated time that industrial and other personnel spend at the educational institution(s), and in other in-kind contributions. Industry personnel should become actively engaged in curriculum development and teaching. Cost share can also include contributed time of pre-college educational personnel spent on developing materials for the project

Sample Activity: XYZ Technical College, joining with ABC University Engineering Technology Department and PQR Middle School and PQR High School, requests a three-year effort to develop a "design and manufacturing laboratory" for middle school students. Through this effort these students will develop ideas to solve everyday problems found in their homes or communities, design appropriate solutions, "manufacture" the solutions, and test them in use. The laboratory is an integral part of the mathematics and science education programs and is also a focus

for social studies courses where surveys of needs in the community are conducted. Local manufacturing and other engineers assist the school's faculty in developing and running the laboratory. Students hold annual demonstrations of their accomplishments where members of the local community are invited. Teaching materials are prepared to guide other school systems in the development and use of these programs. Similar linking programs are developed for the participating high school to provide a pathway for these students.

5.2.6 Other Innovations in Manufacturing Engineering Education

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The purpose of this Focus Area is to provide an opportunity for innovative proposals in areas other than the specific Focus Areas described above. Joint activities among university-based engineering, engineering technology, and other faculty, and community college faculty are welcome. Industry/university collaboration is expected. These awards may be supplements to ongoing awards by any of the cooperating agencies or they may be new awards. For supplements, the value to be added by the proposed new effort will enter into the review and award-decision making process.

It is anticipated that three-year awards will be made. No renewals are anticipated at this time. The level of funding proposed should be commensurate with the scale and complexity of the project proposed. The institutions of higher education, industry and other sources are expected to match the annual level of the TRP award with cash and in-kind contributions. Cost share can include the compensated time that industrial and other personnel spend at the educational institution(s), and in other in-kind contributions. Industry personnel should become actively engaged in curriculum development and teaching.

Sample Activity: Faculty in the schools of engineering, arts and sciences, and education at University QRS have teamed to develop an innovative software/hardware system for manufacturing education. The system will integrate the design, manufacture, and test experience that is needed in industry as a part of the engineering educational curriculum. It will be developed by faculty in engineering, education, psychology, and computer science. The system will provide a "virtual" manufacturing experience for students from a wide range of disciplinary backgrounds. A three-year award is requested. The industry cost share includes funds, compensated time of industrial personnel in the development of the system, and the fair value of the use of "virtual reality" equipment that is owned by the industrial partners.

5.3 Guidelines for Assembling a Team

The Manufacturing Engineering Education Grant Program (10 U.S.C. § 2196) requires that every proposal team in each of the various Focus Areas of Manufacturing Education and Training include at least one institution of higher education or consortium of institutions of higher education. In addition, all projects must have industrial partners with resource contribution as required by the legislation. Here are specific requirements:

- "Educational Traineeships for Defense Industry Engineers" proposals require the participation of at least one engineering or engineering technology program of a university, four-year college, community college or vocational/technical college.
- "Retraining the Manufacturing Workforce" requires the participation of at least one university engineering program, university technology program, or four-year college engineering program, and at least one community college engineering program or vocational/technical education program.
- "Practice-Oriented Master's Degree" proposals must include a university engineering program and may include one or more university technology programs.
- "Engineering Education in Manufacturing across the Curriculum" proposals require the participation of at least one university, four-year college, or community college engineering or engineering technology program and may include vocational/technical programs as well .
- In the "Manufacturing Education for Pre-College Students" Focus Area, pre-college institutions or school systems must team with colleges, universities, or vocational/technical institutions, with one of the latter category in the lead position on the proposal.
- Proposals for "Other Innovations in Manufacturing Engineering Education" require the leadership of a university, four-year college, community college, or vocational/technical institution, and may also include pre-college institutions.

5.4 Cost Sharing Requirements and Quality of Cost Share

5.4.1 Background

Funding available for the current competition totals approximately $30 million, and is provided under the Manufacturing Engineering Education Grant Program (10 U.S.C. § 2196). There are no predetermined amounts for the various Focus Areas. The MET Competition Area Source Selection Evaluation Board will make the selections based on a comparative judgment of the perceived merit of the various proposals across all Focus Areas.

Awardees are expected to provide funds matching the Federal level of support from the participating institutions of higher education, industry, and other non-Federal sources such as state and local agencies.

In general, proposers are expected to use non-Federal resources to meet cost sharing requirements. In the MET Competition Area, non-TRP funding and technical assistance from all sources, including Federal Government entities, may be used to match TRP funds. However, proposers should be aware that substantial dependence on Federal funds or technical assistance to meet cost sharing requirements may reduce the attractiveness of their proposals in the areas of resources and industry involvement.

Cost share may include cash (including compensated personnel time) and in-kind support such as contributed equipment and facilities. TRP statutes require non-Government participants in

all TRP projects to provide at least 50 percent of project costs. Funds used as cost share in other program awards may not be used as cost share for TRP MET awards.

5.4.2 Cost Share Classifications

Cost share is classified as either cash or in-kind as follows:

5.4.2.1 Cash

Cash contributions are outlays of funds to support the total project through acquiring material, buying equipment, paying labor (including benefits and direct overhead associated with that labor), and other cash outlays required to perform the statement of work. Government IR&D funds may be used as a source of cash for TRP projects, even though they remain eligible for reimbursement by the Government. Cash can be derived from any source of funds within the participating partners' accounting systems. Cash also can be derived from outside sources, such as donations from state or local governments or funds from venture capitalists.

5.4.2.2 In-Kind

a) In-kind contributions are the reasonable value of equipment, materials, or other property used in the performance of the statement of work. Generally, in-kind contributions are hard to see and value (such as space or use of equipment) and intellectual property (technology transfer activities). In particular, when proposing intellectual property for in-kind cost share, the offeror should consider the following: Is its use central to the project; is it a real or incidental resource; what is the fair market value of the intellectual property as it is actually used on the project?

b) Technology transfer activities may be included in a participant's contribution subject to an evaluation of the value of such activities to the Partnership and a limit of their value to no more than the prior investment in the proprietary technology involved.

c) The in-kind value of equipment (including software) shall not exceed its fair market value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

d) The in-kind value of space (including land or buildings) shall not exceed its fair rental value and shall be pro-rated according to the share of its total use dedicated to carrying out the project.

5.5 Selection Criteria

Proposals will undergo a merit review. The MET selection criteria, which incorporate all statutory selection criteria, are weighted equally and are as follows:

5.5.1 Commitment to Education

- Comprehensive effort focused on curriculum development, degree program, or systemic reform of manufacturing education, integrating a range of engineering disciplines and assuring relevance to industrial experience in a range of sectors;
- Solid commitment to prepare students for engineering practice by providing intellectual rigor and hands-on manufacturing experience or to improve the knowledge and skill levels of the manufacturing workforce on the factory floor with a strong reorientation toward dual-use capacity; and
- Institutional commitment to support students, to build teamwork and partnerships across disciplines, institutions, and sectors, and to test, assess, implement, and disseminate the outcome.

5.5.2 Innovativeness

- Innovative approaches to developing curriculum, course materials, or tools and software for teaching and learning that will significantly enhance students' knowledge and skills in the process of making things;
- Creative approaches to providing real-world manufacturing simulation, developing and managing practice-oriented hands-on laboratory or on-site industrial experiences, including the availability of up-to-date equipment;
- Development of highly innovative educational materials to strengthen the knowledge of the technical workforce in science, mathematics, and engineering and the expertise of design/manufacturing engineers in actual production; and
- Provision of enriching environment wherein industrial experts can contribute to the knowledge and skills of students and faculty and provide them a high level of understanding of real-world, dual-use manufacturing issues.

5.5.3 Target Populations

- Strong track record of involving, or strong commitment to involve, Defense firms, Defense workers (employed or unemployed), women, underrepresented minorities, and persons with disabilities;
- Effective means to improve the technical skills of the above-cited groups and to provide a stimulating and enriching environment conducive to their remaining in the manufacturing sector;
- Creative ways to link to pre-college populations to attract students early in their school years to regard manufacturing as a worthwhile and exciting endeavor; and
- Strong potential impact on a broad spectrum of technical workforce relevant to dual-use manufacturing issues.

5.5.4 Resources

- Individual or team with outstanding record of quality contributions to advances of research, education, or technology in manufacturing, active collaboration with industry, and cross-disciplinary integration;
- Facility/equipment resources necessary to provide students up-to-date hands-on experience in manufacturing and to develop innovative technology and courseware for education and training; and
- Committed academic, industrial, and other non-Federal cash or verifiable in-kind resources meeting or exceeding the 50% requirement, or strong evidence of doing so by the end of the first year.

5.5.5 Industrial Involvement

- High level of industrial participation, such as in planning, course development, teaching, mentoring, and assessment, to bring relevant industrial viewpoints and experiences to the faculty and students; and
- Contribution of equipment and personnel support to provide the students up-to-date, meaningful, real-world experience relevant to dual-use manufacturing capacity development.

5.6 Proposal Instructions

Each proposal must specify only one of the six (6) MET Focus Areas. For the purposes of this competition proposals will be rejected as out of scope unless they clearly demonstrate that they fall within a Focus Area.

The person who is technically responsible for the development and implementation of the proposed activities should be indicated as the Proposing Team Principal Point of Contact, not someone in the sponsored research office of the proposing institution.

TRP Manufacturing Education and Training proposers shall prepare a technical proposal and cost proposal according to the following formats and responding to the above selection criteria. Discussion is provided to assist proposers with organizing their submissions.

5.6.1 Proposal Page Formats

The technical and cost proposal page count shall include every page, including pages that contain words, table of contents, executive summary, management information and qualifications, resumes, figures, tables, and pictures. All proposals shall be printed such that pages are single-sided, with no more than fifty-five (55) lines per page. Use 21.6 x 27.9 cm (8 1/2" x 11") paper or A4 metric paper. Use an easy-to-read font of not more than about 5 characters per cm (fixed pitch font of 12 or fewer characters per inch or proportional font of point size 10 or larger). Smaller type may be used in figures and tables, but must be clearly legible. Margins on all sides (top, bottom, left and right) must be at least 2.5 cm. (1").

5.6.2 Technical Proposal Format

Technical proposals shall be a maximum of thirty-six (36) pages long. Each technical proposal shall include the following three sections:

5.6.2.1 Section 1—Executive Summary

The Executive Summary shall provide a brief description of the contents of the proposal. (maximum length five (5) pages). A brief technical abstract suitable for an educated lay audience should be inserted before the Executive Summary.

The Executive Summary should be written to cogently define your proposal's goals, the approach you are taking, and the expected results. This summary should include discussion of pertinent practices, approaches, and techniques to be applied in the project. Its purpose is to provide reviewers an overview of the approach proposed.

5.6.2.2 Section 2—Body of the Proposal

This section of the proposal shall give a detailed explanation of the approach, merit and benefits to be derived from the proposed activities, and the management plan. It shall consist of no more than thirty (30) pages and shall include:

- a thorough technical description of proposed activities;
- a Statement of Work that discusses the specific tasks to be carried out;
- a management plan including an action plan of significant steps in the development and implementation of the project, including technical/educational milestones,
- a summary of the cost contributions from each member of the partnership;

This section should include all information necessary for evaluators to make an informed judgment regarding the merits of the proposal. It should address all aspects of the proposed project

as they relate to the selection criteria for MET. Proposers should insure that their discussions at a minimum address the following points:

Quality: How does the proposed effort advance the state of the art or improve on existing or mature education and training methods? Does the project propose fundamentally new approaches or combinations of approaches? What are the advantages of the proposed approach over alternatives, and are there demonstrable quantitative or qualitative measures of this. Does the work proposed duplicate that of other Federal Government efforts?

Feasibility: Is there evidence or documentation of the feasibility of the project? Are the proposed costs consistent with the costs of analogous development activities?. Are technical barriers and risks identified and discussed. Is there an estimate of the realistic time to implement curricula or new practices based upon anticipated schedules?

Management Plan: Is there evidence that high quality personnel and adequate equipment and facilities are dedicated to the project? Are there plans for mitigating management risks and alternative paths provided? Are there definitive milestones or schedules provided? Is the collective technical experience and expertise of the alliance capable of supporting technical objectives? Are staff and resources present beyond the development phase through to the production?

5.6.2.3 Section 3—Selection Criteria Index

An index showing the pages on which each of the selection criteria is addressed is required. (Maximum length one (1) page)

5.6.3 Cost/Funding Proposal Format

Cost/funding proposals are limited to fifty (50) pages in length, have no specific page layout requirements, and shall address the periods of performance described for each MET Focus Area. Work Breakdown Structures or certified cost or pricing data are neither required nor desired. Cost/funding proposals will be organized to include the following four sections, in order.

5.6.3.1 Section 1—Total Project Cost

This section will give a detailed breakdown of costs of the project. Cost should also be broken down on a task-by-task basis for each task appearing in the Statement of Work. This must include all of the Cost to the Government and Cost Sharing Contributions.

The following information should be presented in your proposal for each phase of the effort: total cost of the TRP project; total contribution proposed by the consortium; total proposed cost share; funding requested from TRP.

Elements of Cost: labor; direct materials; travel; other direct costs; equipment; software; patents; royalties; other costs; indirect costs; cost of money or profit. Sufficient information should be provided in supporting documents to allow the government to evaluate the reasonableness of these proposed costs, including salaries, overhead, equipment purchases, fair market rental value of leased items, and the method used for making such valuations.

5.6.3.2 Section 2—Cost Sharing and In-Kind Contributions

This section will include: (1) the sources of cash and amounts to be used for cost sharing requirements, (2) the specific in-kind contributions proposed, their value in monetary terms, and the methods by which their values were derived, and (3) evidence of the existence of cash or commitments to provide cash in the future. Affirmative statements are required from outside sources of cash.

Proposals should contain sufficient information regarding the sources of cost share so that a determination may be made by the government regarding the availability, timeliness, and control of resources.

5.6.3.3 Section 3—Cost to the Government

This section will specify the total costs to be borne by the Government and any technical or other assistance including equipment, facilities, and personnel of Federal laboratories required to support these activities. The Cost to the Government should be that portion of the proposed effort which is not covered by your cost share.

Proposals should contain sufficient information regarding the resources to be provided by the government so that an evaluation of their availability, timeliness, and control may be made.

5.6.3.4 Section 4—Off-Budget Supporting Resources

This section will show cash or in-kind resources which will support the proposed activity, but which you do not intend to include in the total project cost. Items in this category do not count as cost share nor as Federal funds which must be matched.

Examples of items to place in this category include: Commitments of cash or in-kind resources from other Federal sources, such as national laboratories; and, projections of fee-based income where there is substantial uncertainty about the level which will actually be collected, and where the income is not needed to meet cost-share requirements. In-kind services for client companies where the actual usage levels will be determined by company needs, and are therefore uncertain as to level, and where the in-kind resources are not needed to meet cost-share requirements.

5.7 Additional Proposal Considerations

5.7.1 Presentations, Reports, Interviews, and Site Reviews

During the proposal review and selection process, proposers may be asked to host a site visit by members of the selection panel or TRP staff, or to travel to Washington, DC, or another location for an interview.

5.7.2 Reporting Requirements and Metrics

All awardees will be required to make periodic reports on technical progress and financial outlays associated with their TRP project. and to develop data bases of indicators of progress and outcome under TRP guidance. The TRP will provide reporting guidelines and data base templates. Such reports are not intended to constitute an onerous burden on awardees. Their purpose will be to assist TRP management with monitoring progress towards stated project goals and a means to determine the overall degree to which the TRP is succeeding or failing. Recipients of awards for Manufacturing Education and Training will be required to provide periodic progress reports and to establish data bases of indicators of progress.

5.7.3 Deadline for Proposals

Deadline for receipt of proposals is expected to be March 17, 1995. Any proposal received after the exact time specified for receipt will not be considered unless it is received before an award is made, and: (a) it was sent by registered or certified mail not later than March 13, 1995 or by U.S. Postal Service Express Mail Next Day Service-Post Office to Addressee on or before 4:00 PM at the address of mailing on March 15, 1995 or (b) it was sent by mail and it is determined by the government that the late receipt was due solely to mishandling by the government after receipt at the government installation.

Note: There are no other provisions for late receipt of proposals.

6. SMALL BUSINESS INNOVATION RESEARCH (SBIR) COMPETITION AREA

6.1 Introduction

The Technology Reinvestment Project (TRP) plans to solicit proposals from small businesses with strong research and development capabilities in science or engineering under the solicitation of the main initiative on or about March 17, 1995 (not the standard SBIR program) entitled "Defense Technology Conversion, Reinvestment, and Transition Assistance." The TRP expects to award only SBIR Phase I contracts under this solicitation and Phase II proposals under future appropriations.

The Federal SBIR Program is mandated by the Small Business Innovation Development Act of 1982, P.L. 97-219, P.L. 99-443, and P.L. 102-564. The basic design of the SBIR Program is in accordance with the Small Business Administration (SBA) SBIR Policy Directive, January 1993. This SBIR initiative will be sponsored by the TRP to exploit the flexibility of the SBA Policy Directive and encourage scientific and technical innovation in the Technology Focus Areas most likely to yield results important to the TRP.

6.1.1 Tentative Schedule

The following is the planned schedule for the SBIR Competition:

Publication of Announcement in Commerce Business Daily (CBD):	October 21, 1994
Outreach Period:	October 21, 1994 - February 3, 1995
Publication of Solicitation:	February 3, 1995
Due Date for Proposals:	March 17, 1995
Publication of Selections:	May 1995
Completion of Negotiations:	September 1995

6.1.2 TRP Outreach Activities

The TRP plans to conduct a variety of SBIR outreach activities around the United States up until February 3, 1995. Information about TRP-related meetings, publications, and other outreach activities can be obtained by calling the TRP at 1-800-DUAL-USE.

Each state has identified a point of contact to provide additional coordination and information for companies within the state wishing to participate in TRP. Activities sponsored by a state may include networking opportunities, proposal workshops, or development of a partnering database. Although the TRP staff in Washington coordinates some activities with these representatives, it is important to note that the TRP cannot endorse state policies and selection criteria as part of the TRP process. A list of the state representatives, as provided to the TRP, appears in Appendix A.

6.1.3 Limitations on Foreign Access to TRP-Funded Technology

The Department of Defense Authorization Act for Fiscal Year 1995 includes a statutory condition on the funding of TRP projects that "the principal economic benefit of, and, to the extent practicable, the job creation resulting from [TRP projects] accrue to the economy of the United States." This philosophy was a cornerstone of TRP policy before its enactment by Congress. In keeping with both philosophy and legislative directive, TRP agreements include a provision requiring the participants to disclose to the Government certain forms of transfers of technology to

foreign entities and to obtain permission prior to implementing such transfers. The controls contemplated in this provision are in addition to, and do not change or supersede, the provisions of the International Traffic in Arms Regulation (22 CFR pt. 121 et seq.), the DoD Industrial Security Regulation (DoD 5220.22-R) and the Department of Commerce Export Regulation (15 CFR pt. 770 et seq.)

Transfers governed by this provision include the sale of a company, and sales or licensing of technology. The notice and approval requirement does not apply, however to:

- sales of products or components, or
- licenses of software or documentation related to sales of products or components, or
- transfers to foreign subsidiaries of TRP alliance participants for purposes related to the TRP project, or
- transfers which provide access to technology to a foreign firm or institution which is an approved source of supply or source for the conduct of research in the TRP project provided that such transfer shall be limited to that necessary to allow the firm or institution to perform its approved role in the TRP project.

6.2 SBIR Set–Aside in the FY 95 TRP

The FY 95 TRP general solicitation will include a Small Business Innovation Research (SBIR) set–aside. SBIR proposals are invited in the thirteen Focus Areas specified for the Technology Development Competition Area ONLY (see Section 4.2 of this document, above). An SBIR Phase I proposal can be submitted in two ways—a small business can associate with partners under the major TRP and embed a Phase I effort in that proposal, or it can submit a stand-alone SBIR Phase I effort. SBIR Phase I awards are for periods up to six months in amounts up to $99,000.

6.3 New Cost Share Opportunity

Use of unexpended SBIR and STTR (Small Business Technology Transfer) funds as part of a TRP team's non-Federal cost share is now permitted by TRP Program statutes under certain circumstances. Work that is being done under any SBIR or STTR program can qualify for use as non-Federal cost share if it contributes centrally and directly to a proposed TRP effort. Unexpended SBIR or STTR funds available at the TRP proposal due date (expected to be March 17, 1995) will be eligible for use as non-Federal cost share in the event that the TRP proposal is selected.

Additionally, small businesses can associate with partners and incorporate a Phase I effort into a TRP proposal. The funds received from the SBIR effort could contribute $99,000 of SBIR funds to the TRP cost share requirement if the TRP proposal and its "embedded" SBIR proposal are selected.

TRP proposals that include an embedded SBIR proposal must include a brief discussion of the SBIR effort within the technical discussion of the TRP proposal itself. This discussion should include a description of the SBIR project objectives and the relationship and relevance of the SBIR effort to the overall objectives of the proposed TRP effort. The anticipated cost share gained from the inclusion of the SBIR effort must be noted under the "Other" category in the cost section of the TRP proposal. The SBIR proposal, describing the proposed effort in detail, must be prepared in accordance with standard SBIR program requirements and submitted separately from the TRP proposal.

SBIR is a three-phased program. Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas submitted under the SBIR Program. Typically, Phase I

will involve a one-half-person-year effort (not to exceed $99,000) over a period generally not to exceed six months. Proposals should concentrate on research or research and development that significantly contributes to proving the scientific and technical feasibility of the proposed effort, the successful completion of which is a prerequisite for further TRP support in Phase II. The measure of Phase I success includes evaluations of the extent to which Phase II results would have the potential to yield a dual-use product or process of continuing importance to DoD, and having significant commercial applications. If it appears to have such potential, proposers are encouraged to obtain a contingent commitment for private follow-on funding to pursue further development of the commercial potential after the TRP-funded research and development phases. Subsequent Phase II awards will be made to firms on the basis of results from the Phase I effort and the scientific and technical merit of the Phase II proposal. Phase II awards will typically cover two to four person-years of effort, with a base of $375K and options up to a total of $750K over a period generally not to exceed 24 months (subject to negotiation). Phase II is the principal research or research and development effort and is expected to produce a well-defined deliverable product or process. A more comprehensive proposal will be required for Phase II.

TRP funds may be used to pursue Phase III efforts with dual-use (Defense and commercial) applications. Also, under Phase III, Federal agencies may award non-SBIR-funded follow-on contracts without further competition for products or processes that meet the mission needs of those agencies. The planned TRP SBIR solicitation is designed to provide incentives for the conversion of federally-sponsored research and development innovation in the private sector.

The forthcoming TRP SBIR solicitation is for Phase I proposals only. Proposals submitted under prior SBIR solicitations will not be considered under this solicitation; however, offerors who were not awarded a contract in response to a particular topic under prior SBIR solicitations are free to update or modify and submit a modified proposal *if* it fits within one of the Technology Focus Areas described in Section 3.2 of this PIP.

For Phase II, no separate solicitation will be issued and no unsolicited proposals will be entertained. Additionally, Phase II efforts are contingent upon availability of FY 95 Defense Conversion funds. The TRP is not obligated to make awards under either Phase I, II or III. TRP is not responsible for any monies expended by the proposer before award of any contract.

6.3.1 Eligibility and Limitation

Each proposer must qualify as a small business for research or research and development purposes and certify to this in the proposal. In addition, a minimum of two-thirds of the research and analytic work of each Phase I SBIR project and one-half of each Phase II project must be performed by the proposing firm, unless otherwise approved in writing by the contracting officer. For both Phase I and II, the primary employment of the principal investigator must be with the small business firm at the time of the award and during the conduct of the proposed effort. Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Deviations from these requirements must be approved in writing by the contracting officer (during contract negotiations).

For both Phase I and Phase II, research and development work must be performed by the small business concern in the United States. "United States" means the fifty states, the Territories and Possessions of the United States, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, and the District of Columbia.

Joint ventures and limited partnerships are permitted, provided that the entity created qualifies as a small business in accordance with the Small Business Act, 15 U.S.C. § 631.

6.3.2 Conflicts of Interest

Awards made to firms owned by or employing current or previous Federal Government employees could create conflicts of interest for those employees in violation of 18 U.S.C. § 208 and 10 U.S.C. § 2397. Such proposers should contact the cognizant Ethics Counselor.

6.4 Definitions

The following definitions apply for the purposes of this chapter:

6.4.1 Research or Research and Development

6.4.1.1 Basic Research

Includes all efforts of scientific study and experimentation directed toward (1) increasing knowledge and understanding in those fields of the physical, engineering, environmental and life sciences. It provides fundamental knowledge required for the solution of problems. It forms a part of the base for subsequent exploratory and advanced developments.

6.4.1.2 Applied/Exploratory Development

Includes all efforts directed toward the solution of specific problems in short or major development projects. This type of effort may vary from fairly fundamental applied research to quite sophisticated bread-board hardware, study, programming and planning efforts. It would thus include studies, investigations and minor development efforts. The dominant characteristic of this category of effort is that it be pointed toward specific problem areas with a view toward developing and evaluating the feasibility and practicability of proposed solutions and determining their parameters.

6.4.1.3 Advanced Development

Includes all efforts directed toward projects that have moved into the development of hardware for test. The prime result of this type of effort is proof of design concept, frequently realized by building and testing a prototype.

6.4.2 Small Business

A small business concern is one that, at the time of award of a Phase I or Phase II contract:

- Is independently owned and operated and organized for profit, is not dominant in the field of operation in which it is proposing, and has its principal place of business located in the United States;
- Is at least 51% owned, or in the case of a publicly owned business, at least 51% of its voting stock is owned, by United States citizens or lawfully admitted permanent resident aliens;
- Has, including its affiliates, a number of employees not exceeding 500, and meets the other regulatory requirements found in 13 C.F.R 121. Business concerns, other than investment companies licensed, or state development companies qualifying, under the Small Business Investment Act of 1958, 15 U.S.C. § 661 et seq., are affiliates of one another when either directly or indirectly (1) one concern controls or has the power to control the other; or (2) a third party or parties controls or has the power to control both. Control can be exercised through common ownership, common management, and contractual relationships. The term "affiliate" is defined in greater detail in 13 C.F.R. 121.3-2(a). The term "number

of employees" is defined in 13 C.F.R. 121.3-2(t). Business concerns include, but are not limited to, any individual, partnership, corporation, joint venture, association or cooperative.

6.4.3 Socially and Economically Disadvantaged Small Business

A small business that is at the time of award of a Phase I or Phase II contract:

- At least 51% owned by an Indian tribe or a native Hawaiian organization, or one or more socially and economically disadvantaged individuals, and
- Whose management and daily business operations are controlled by one or more socially and economically disadvantaged individuals.

A socially and economically disadvantaged individual is defined as a member of any of the following groups: Black-Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Subcontinent-Asian Americans, or other groups designed by SBA to be socially disadvantaged.

6.4.4 Woman-Owned Small Business

A woman-owned small business is one that is at least 51% owned by a woman or women who also control and operate it. "Control" in this context means exercising the power to make policy decisions. "Operate" in this context means being actively involved in the day-to-day management.

6.4.5 Funding Agreement

Any contract, grant, or cooperative agreement entered into between any Federal agency and any small business concern for the performance of experimental, development, or research work funded in whole or in part by the Federal Government.

6.4.6 Subcontract

A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by a Federal Government contract awardee calling for supplies or services required solely for the performance of the original contract. This includes consultants.

6.4.7 Commercialization

The process of developing markets and producing and delivering products for sale (whether by the originating party or by others); as used here, commercialization includes both government and private sector markets.

6.5 Planned Proposal Requirements

A proposal under the TRP SBIR Program is expected to provide sufficient information to demonstrate that the proposed work represents an innovative approach to the investigation of an important scientific or engineering problem under the stated selection criteria. Technical proposals will not exceed 25 pages.

The quality of the scientific or technical content of the proposal will be the principal basis upon which proposals will be evaluated. The proposed research or research and development must be responsive to the chosen topic. Small business concerns contemplating a bid for work on these specific topics should determine that (a) the firm has a technical approach that has a reasonable chance of meeting the topic objective, (b) the technical approach is innovative, not routine, and (c) the firm has the capability to implement the technical approach, i.e., has or can obtain people and equipment suitable to the task.

6.6 Method of Selection and Evaluation Criteria

6.6.1 Introduction

Phase I proposals will be evaluated on a competitive basis. Proposals meeting the stated solicitation requirements will be evaluated by scientists or engineers knowledgeable in the Technology Focus Area. Proposals will be evaluated first on their relevance to the Technology Focus Area to which they are directed. Those found to be relevant will then be evaluated using the criteria listed in Section 6.6.2. Final decisions will be made by the TRP based upon these criteria and consideration of other factors including possible duplication of other work, and program balance. The government agency may elect to fund several or none of the proposed approaches to the same topic. In the evaluation and handling of proposals, every effort will be made to protect the confidentiality of the proposal and any evaluations. There is no commitment by the government to make any awards in any Technology Focus Area, to make a specific number of awards or to be responsible for any monies expended by a proposer before award of a contract.

Phase II proposals will be subject to a technical review process similar to Phase I. Final decisions will be made by the government based upon scientific and technical evaluations and other factors, including the possible duplication with other research or research and development, program balance, budget limitations, and the continuing interest to the government or the commercial sector.

6.6.2 Evaluation Criteria - Phase I and Phase II

The TRP plans to select for award those Phase I proposals offering the best value to the government and the nation considering the following factors:

- The soundness and technical merit of the proposed innovative approach and its progress toward topic solution.
- The potential for commercial (government or private sector) application and the benefits expected to accrue from this commercialization.
- The qualifications of the proposed principal/key investigators, supporting staff and consultants. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.

Consideration of a proposal's commercial potential is evidenced by (1) the small business concern's record of commercializing SBIR or other research, (2) the existence of Phase II funding commitments from private sector or non-SBIR funding sources, (3) the existence of Phase III follow-on commitments for the subject of the research, or (4) the presence of other indicators of commercial potential for the idea.

The reasonableness of the proposed cost of the effort to be performed will be examined to determine those proposals that offer the best value to the government. Where technical evaluations are essentially equal in merit, cost to the government will be considered in determining the successful offeror.

Technical reviewers will base their conclusions only on information contained in the proposal. It cannot be assumed that reviewers are acquainted with the firm or key individuals or any referenced experiments. Relevant supporting data such as journal articles, literature, including government publications, and other such materials, should be included or referred to in the proposal.

6.6.3 Deadline for Proposals

Deadline for receipt of proposals is expected to be March 17, 1995. Any proposal received after the exact time specified for receipt will not be considered unless it is received before an award

is made, and: (a) it was sent by registered or certified mail not later than March 13, 1995 or by U.S. Postal Service Express Mail Next Day Service-Post Office to Addressee on or before 4:00 PM at the address of mailing on March 15, 1995 or (b) it was sent by mail and it is determined by the government that the late receipt was due solely to mishandling by the government after receipt at the government installation.

Note: There are no other provisions for late receipt of proposals.

6.7 Cost Sharing

Cost sharing will be permitted for TRP SBIR proposals; however, cost sharing is not required nor will it be an evaluation factor in the consideration of any Phase I proposal.

APPENDIX A: STATE POINTS OF CONTACT

Each state has identified a point of contact to provide additional coordination and information for companies within the state wishing to participate in TRP. Activities sponsored by a state may include networking opportunities, proposal workshops, or development of a partnering database. Although the TRP staff in Washington coordinates some activities with these representatives, it is important to note that the TRP cannot endorse state policies and selection criteria as part of the TRP process.

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TRP Concept Paper

Cover Sheet

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1. Proposal Title

2. Please check one: A. [ ] Development or B. [ ] Regional Technology Alliances

3. Lead Proposer (Name, Full Address)	4. Other Participating Organizations
Phone/Fax:	
E-Mail:	

5. FY 95 Technology Development Focus Areas (check only one)

A. [ ] BIOLOGICAL SENSORS AND MULTI-ORGAN DIAGNOSTIC SCREENING
B. [ ] OPERATIONS OTHER THAN WAR/LAW ENFORCEMENT
C. [ ] AFFORDABLE POLYMER MATRIX COMPOSITES FOR AIRFRAME STRUCTURES
D. [ ] LOW COST SPECIALTY METALS PROCESSING
E. [ ] MILLIMETER WAVE PRODUCTS FOR MILITARY AND CIVILIAN APPLICATIONS:
F. [ ] ELECTRIC AND HYBRID TACTICAL AND COMMERCIAL VEHICLES
G. [ ] CERAMIC MATERIAL APPLICATIONS
H. [ ] SMALL PRECISION OPTICS MANUFACTURING TECHNOLOGY
I. [ ] DIGITAL WIRELESS COMMUNICATIONS AND NETWORKING SYSTEMS
J. [ ] AFFORDABLE ADVANCED CONTROLS TECHNOLOGIES
K. [ ] CRYOGENIC COOLERS FOR ELECTRONIC SYSTEMS
L. [ ] MICROELECTROMECHANICAL SYSTEMS (MEMS) APPLICATIONS
M. [ ] OTHER (Describe) _____

6. Funding/ Cost Share		TRP USE ONLY
Estimated Base Period Cost to TRP		
Estimated Base Period Cost Share by Alliance		
Estimate Base Period Duration (months)		

The name and address of the Lead Proposer will be made available to Federal, State and Local Government Organizations for the purpose of Outreach Activities UNLESS indicated below.

( ) I DO NOT wish my name and address to be made available for such purposes.

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