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The Department of Defense

Small Business Technology Transfer (STTR) *Pilot Program*

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FY 1994

Program Solicitation
Closing Date: 1 APRIL 1994

DoD Departments/Agencies



Department
of the
Army



Department
of the
Navy



Department
of the
Air Force



Advanced
Research
Projects Agency

BMDO

Ballistic
Missile Defense
Organization

DoD STTR FY94 Topics

ARMY 94T001	High Performance Computing and Simulation
ARMY 94T002	Sensors and Information Processing
ARMY 94T003	Advance Materials and Manufacturing
NAVY 94T001	Electronic Components & Systems\Electronics
NAVY 94T002	High Power Semiconductors\Electronics
NAVY 94T003	Signal Processing Chips\Electronics
AF 94T001	Aerospace Technology
AF 94T002	Materials Processing - Modeling and Analysis
AF 94T003	Materials for High Temperature Electronic Packaging
AF 94T004	Advanced Human-Computer Interfaces
ARPA 94T001	Low Cost Electronics Manufacturing
ARPA 94T002	High Energy Electron Beam Processing of Materials
ARPA 94T003	Strategic Planning Tools Based on Object-Oriented Technology
ARPA 94T004	Real Time Contextual Analysis of Multi-Sensor Scenes
ARPA 94T005	Distributed Micro/Mini Sensor Systems for Tactical Oceanography and Environmental Monitoring in Littoral Areas
ARPA 94T006	Remote Fiber Optic Links
ARPA 94T007	Graphical Imaging of Waste or Contaminant Flow for Environmental Monitoring System Design
BMDO 94T001	Sensors
BMDO 94T002	Electronics and Photonics
BMDO 94T003	Computing
BMDO 94T004	Surprises and Opportunities

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PROGRAM SOLICITATION

Number 94

Small Business Technology Transfer (STTR) Program

IMPORTANT

The DoD is updating its SBIR/STTR Mailing list. To remain on the mailing list or to be added to the list, send in the Mailing List form (Reference E), found at the back of this solicitation, to DTIC.

U.S. Department of Defense
STTR Program Office
Washington, DC 20301

Closing Date: APRIL 1, 1994

Deadline for receipt of
proposals at the DoD
Component is 2:00 p.m.
local time.

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DOD PROGRAM SOLICITATION FOR SMALL BUSINESS TECHNOLOGY TRANSFER

1.0 PROGRAM DESCRIPTION

1.1 Introduction

The Army, Navy, Air Force, Advanced Research Projects Agency, and Ballistic Missile Defense Organization hereafter referred to as DoD Components, invite small business firms and research institutions to jointly submit proposals under this program solicitation entitled Small Business Technology Transfer (STTR). The STTR Program is a pilot program under which awards are made to small business concerns for cooperative research and development, conducted jointly by a small business and a research institution, through a uniform process having three phases. STTR, although modelled substantially on the SBIR Program, is a separate program and is separately financed. Subject to availability of funds, DoD Components will support high quality cooperative research and development proposals of innovative concepts to solve the listed defense-related scientific or engineering problems, especially those concepts that also have high potential for commercialization in the private sector.

The STTR Program is designed to provide a strong incentive for small companies and researchers at research institutions, i.e., non-profit institutes, contractor-operated federally funded research and development centers (FFRDC), and universities, to work together to move ideas from the laboratory to the marketplace, to foster high-tech economic development, and to advance U.S. economic competitiveness.

The Federal STTR Program is mandated by Public Law 102-564. The basic design of the DoD STTR Program is in accordance with the Small Business Administration (SBA) STTR Policy Directive of 1993. The DoD Program presented in this solicitation strives to encourage scientific and technical innovation in areas specifically identified by DoD Components. The guidelines presented in this solicitation incorporate and exploit the flexibility of the SBA Policy Directive to encourage proposals based on scientific and technical approaches most likely to yield results important to DoD and the private sector.

1.2 Three Phase Program

This program solicitation is issued pursuant to the Small Business Research and Development Enhancement Act of 1992, PL 102-564. Phase I is to determine the scientific, technical and commercial merit and feasibility of the proposed cooperative effort and the quality of

performance of the small business concern with a relatively small investment before consideration of future DoD support in Phase II. Several different proposed solutions to a given topic may be funded. Proposals will be evaluated on a competitive basis giving primary consideration to the scientific and technical merit of the proposal along with its potential for commercialization. Phase I will typically be one half-person year effort over a period not to exceed one year.

Subsequent Phase II awards will be made to firms on the basis of results from the Phase I effort and the scientific, technical merit and commercial potential of the Phase II proposal. Phase II awards will typically cover 2 to 5 person-years of effort 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.

Under Phase III, the small business is expected to use non-federal capital to pursue private sector applications of the research or development. Also, under Phase III, federal agencies may award non-STTR funded follow-on contracts for products or processes which meet the mission needs of those agencies.

DoD is not obligated to make any awards under either Phase I, II, or III. DoD is not responsible for any monies expended by the proposer before award of any contract.

1.3 Follow-On Funding

In addition to supporting scientific and engineering research and development, another important goal of the program is conversion of DoD-supported research or research and development into commercial products. Proposers are encouraged to obtain a contingent commitment for private or non-STTR follow-on funding prior to Phase II. This commitment may be contingent upon the DoD supported research or development meeting some specific technical objectives in Phase II which if met, would justify non-federal funding to pursue further development for commercial purposes in Phase III. *Note that when several Phase II proposals receive evaluations being of approximately equal merit, proposals that demonstrate such a commitment for follow-on funding will receive extra consideration during the evaluation process.*

The recipient will be permitted to obtain commercial rights to any invention made in either Phase I or Phase II, subject to the patent policies as stated in Section 5.7.

1.4 Eligibility and Limitation

Each proposer must qualify as a small business for research or research and development purposes as defined in Section 2.3 and certify to this on the Cover Sheet (Appendix A) of the proposal. In addition, a minimum of 40 percent of each STTR project must be carried out by the small business concern and a minimum of 30 percent of the effort performed by the research institution, as defined in Section 2.4.

A small business concern must negotiate a written agreement between the small business and the research institution allocating intellectual property rights and rights to carry out follow-on research, development, or commercialization (see Reference A).

For both Phase I and Phase II, the research or research and development work must be performed by the small business concern and research institution 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 for the small business portion, provided that the entity created qualifies as a small business in accordance with the Small Business Act, 15 USC 631, and the definition included in Section 2.3.

1.5 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 USC and 10 USC 2397. Such proposers should contact the cognizant Ethics Counsellor of the DoD Component for further guidance.

2.0 DEFINITIONS

The following definitions apply for the purposes of this solicitation:

2.1 Research or Research and Development. Systematic study and experimentation directed toward greater knowledge or understanding of the subject studied or toward applying new knowledge to meet a recognized need.

2.2 Cooperative Research and Development. For the purposes of the STTR Program this means research and development conducted jointly by a small business concern and a research institution in which not less than 40 percent of the work is performed by the small business concern, and not less than 30 percent of the work is performed by the research institution.

1.6 Contact with DoD

a. General Information. General information questions pertaining to proposal instructions contained in this solicitation should be directed to:

Mr. Bob Wrenn
STTR Coordinator
OUSD(ANT)/SADBU
U.S. Department of Defense
The Pentagon - Room 2A340
Washington, DC 20301-3061
(703) 697-1481

Other non-technical questions pertaining to a specific DoD Component should be directed in accordance with instructions given at the beginning of that DoD Component's topics in Section 8.0 of this solicitation. Oral communications with DoD Components regarding the technical content of this solicitation during the Phase I proposal preparation periods are prohibited for reasons of competitive fairness.

b. Requests for Copies of DoD STTR Solicitation.
To remain on the DoD SBIR/STTR Mailing list, send in the Mailing List form (Reference E) to DTIC. Additional copies of this solicitation may be ordered from:

Defense Technical Information Center
Attn: DTIC/STTR
Building 5, Cameron Station
Alexandria, Virginia 22304-6415
(800) 225-3842 toll free
(703) 274-6903 commercial

2.3 Small Business Concern. 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 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 "affiliates" 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.

2.4 Research Institution. Any organization that is:

- a. A university.
- b. A nonprofit institution as defined in section 4(5) of the Stevenson-Wydler Technology Innovation Act of 1980.
- c. A contractor-operated federally funded research and development center, as identified by the National Science Foundation in accordance with the government-wide Federal Acquisition Regulation issued in accordance with section 35(c)(1) of the Office of Federal Procurement Policy Act.

2.5 Socially and Economically Disadvantaged Small Business. A small business that is at the time of award of a Phase I or Phase II contract:

- a. At least 51% owned by an Indian tribe or a native Hawaiian organization, or one or more socially and economically disadvantaged individuals, and
- b. 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 designated by SBA to be socially disadvantaged.

2.6 Women-Owned Small Business. A small business concern 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.

2.7 Funding Agreement. Any contract, grant, or cooperative agreement entered into between any federal agency and any small business concern for the performance of experimental, developmental, or research work funded in whole or in part by the federal government. *Only the contract method will be used by DoD components for all STTR awards.*

2.8 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.

2.9 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.

3.0 PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

3.1 Proposal Requirements

A proposal to any DoD Component under the STTR Program is to provide sufficient information to persuade the DoD Component that the proposed work represents an innovative approach to the investigation of an important scientific or engineering problem and is worthy of support under the stated criteria.

The quality of the scientific, technical or commercial 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. Any small business contemplating a bid for work on any specific topic should determine that (a) the

technical approach has a reasonable chance of meeting the topic objective, (b) this approach is innovative, not routine, and (c) the firm and research institution team have the capability to implement the technical approach, i.e. have or can obtain people and equipment suitable to the task.

It should be recognized that while the STTR Program requires a small business and a research institution to undertake a project cooperatively, the Federal contract is with the small business. The small business, and not the research institution, is to provide satisfactory evidence that it will exercise management direction and control of the performance of the STTR funding agreement. Regardless of the proportion of the work or funding of each of the performers under the contract, the small business is to be

primary contractor with overall responsibility for its performance.

Those responding to this solicitation should note the proposal preparation tips listed below:

- Read and follow all instructions contained in this solicitation.
- Use the technical information services from DTIC and other information assistance organizations (Section 7.1 - 7.4).
- Mark proprietary information as instructed in Section 5.5.
- Limit your proposal to 25 pages (excluding company commercialization report).
- Have an agreement between the small business and research institution in place prior to proposal submission (see Section 3.4.o and Reference A).
- Use a type size no smaller than 12 pitch or 11 point.
- Don't include proprietary or classified information in the project summary (Appendix B).
- Include a Red Copy of Appendix A and Appendix B as part of the Original of each proposal.
- Do not use a proportionally spaced font on Appendix A and Appendix B.

3.2 Proprietary Information

If information is provided which constitutes a trade secret, proprietary, commercial or financial information, confidential personal information, or data affecting the national security, it will be treated in confidence to the extent permitted by law, provided it is clearly marked in accordance with Section 5.5.

3.3 Limitations on Length of Proposal

This solicitation is designed to reduce the investment of time and cost to small firms in preparing a formal proposal. Those who wish to respond must submit a direct, concise, and informative research or research and development proposal of no more than 25 pages, excluding commercialization record summary, (no type smaller than 11 point or 12 pitch on standard 8½" X 11" paper with one (1) inch margins, 6 lines per inch), *including Proposal Cover Sheet (Appendix A), Project Summary (Appendix B), Cost Proposal (Appendix C), and any enclosures or attachments.* Promotional and non-project related discussion is discouraged. Cover all items listed below in Section 3.4 in the order given. The space allocated to each will depend on the problem chosen and the principal investigator's approach. In the interest of equity, proposals in excess of the 25-page limitation (including attachments, appendices, or references, but excluding commercialization record summary) will not be considered for review or award.

3.4 Phase I Proposal Format

All pages shall be consecutively numbered and the ORIGINAL of each proposal must contain a completed red copy of Appendix A and Appendix B. Through the signature of the Corporate Official of the small business concern and the signature of the appropriate official of the research institution on Appendix A, the small business concern AND the research institution certify jointly that:

- (1) The proposing firm meets the definition of small business concern found in section 2.3, the proposing institution meets the definition of research institution found in section 2.4, and the proposed STTR project meets the definition of cooperative research and development as defined in section 2.2, and
- (2) Regardless of the proportion of the proposed project to be performed by each party, the small business concern will be the primary party that will exercise management direction and control of the performance of the STTR award.

If the research institution is a contractor-operated Federally funded research and development center, the appropriate official signing for the contractor-operated Federally funded research and development center certifies additionally that it:

- (3) Is free from organizational conflicts of interests relative to the STTR program;
- (4) Did not use privileged information gained through work performed for an STTR agency or private access to STTR agency personnel in the development of this STTR proposal; and
- (5) Used outside peer review as appropriate, to evaluate the proposed project and its performance therein.

a. **Cover Sheet.** Complete RED COPY of Appendix A, photocopy the completed form, and use a copy as Page 1 of each additional copy of your proposal.

b. **Project Summary.** Complete RED COPY of Appendix B, photocopy the completed form, and use a copy as Page 2 of each additional copy of your proposal. The technical abstract should include a brief description of the project objectives and description of the effort. Anticipated benefits and commercial applications of the proposed research or research and development should also be summarized in the space provided. The Project Summary of successful proposals will be submitted for publication with unlimited distribution and, therefore, will not contain proprietary or classified information.

c. Identification and Significance of the Problem or Opportunity. Define the specific technical problem or opportunity addressed and its importance. (Begin on Page 3 of your proposal.)

d. Phase I Technical Objectives. Enumerate the specific objectives of the Phase I work, including the questions it will try to answer to determine the feasibility of the proposed approach.

e. Phase I Work Plan. Provide an explicit, detailed description of the Phase I approach. The plan should indicate what is planned, how and where the work will be carried out, a schedule of major events, and the final product to be delivered. Phase I effort should attempt to determine the technical feasibility of the proposed concept. The methods planned to achieve each objective or task should be discussed explicitly and in detail. This section should be a substantial portion of the total proposal.

f. Related Work. Describe significant activities directly related to the proposed effort, including any conducted by the principal investigator, the proposing firm, consultants, or others. Describe how these activities interface with the proposed project and discuss any planned coordination with outside sources. The proposal must persuade reviewers of the proposer's awareness of the state-of-the-art in the specific topic.

Describe previous work not directly related to the proposed effort but similar. Provide the following: (1) short description, (2) client for which work was performed (including individual to be contacted and phone number), and (3) date of completion.

g. Relationship with Future Research or Research and Development.

- (1) State the anticipated results of the proposed approach if the project is successful.
- (2) Discuss the significance of the Phase I effort in providing a foundation for Phase II research or research and development effort.

h. Potential Post Applications. Describe:

- (1) Whether and by what means the proposed project appears to have potential use by the Federal Government.
- (2) Whether and by what means the proposed project appears to have potential private sector application.

i. Key Personnel. Identify key personnel who will be involved in the Phase I effort including information on directly related education and experience. A concise resume of the principal investigator, including a list of relevant publications (if any), must be included.

j. Facilities/Equipment. Describe available instrumentation and physical facilities necessary to carry out the Phase I effort. Items of equipment to be purchased (as detailed in Appendix C) shall be justified under this section. Also state whether or not the facilities where the proposed work will be performed meet environmental laws and regulations of federal, state (name) and local governments for, but not limited to, the following groupings: airborne emissions, waterborne effluents, external radiation levels, outdoor noise, solid and bulk waste disposal practices, and handling and storage of toxic and hazardous materials.

k. Consultants. If consultants are involved, it should be described in detail and identified in Appendix C.

l. Prior, Current, or Pending Support. If a proposal submitted in response to this solicitation is substantially the same as another proposal that has been funded, is now being funded, or is pending with another federal agency or DoD Component or the same DoD Component, the proposer must indicate action on Appendix A and provide the following information:

- (1) Name and address of the federal agency(s) or DoD Component to which a proposal was submitted, will be submitted, or from which an award is expected or has been received.
- (2) Date of proposal submission or date of award.
- (3) Title of proposal.
- (4) Name and title of principal investigator for each proposal submitted or award received.
- (5) Title, number, and date of solicitation(s) under which the proposal was submitted, will be submitted, or under which award is expected or has been received.
- (6) If award was received, state contract number.
- (7) Specify the applicable topics for each STTR proposal submitted or award received.

Note: If Section 3.4.1 does not apply, state in the proposal "No prior, current, or pending support for proposed work."

m. Cost Proposal. Complete the cost proposal in the form of Appendix C for the Phase I effort only. Some items of Appendix C may not apply to the proposed project. If such is the case, there is no need to provide information on each and every item. What matters is that enough information be provided to allow the DoD Component to understand how the proposer plans to use the requested funds if the contract is awarded.

- (1) List all key personnel by name as well as by number of hours dedicated to the project as direct labor.
- (2) Special tooling and test equipment and material cost may be included under Phases I and II. The inclusion of equipment and material will be carefully reviewed relative to need and appropriateness for the work

proposed. The purchase of special tooling and test equipment must, in the opinion of the Contracting Officer, be advantageous to the government and should be related directly to the specific topic. These may include such items as innovative instrumentation and/or automatic test equipment. Title to property furnished by the government or acquired with government funds will be vested with the DoD Component, unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment by the DoD Component.

- (3) Cost for travel funds must be justified and related to the needs of the project.
- (4) Cost sharing is permitted for proposals under this solicitation; however, cost sharing is not required nor will it be an evaluation factor in the consideration of a proposal.

n. Company Commercialization Report. Describe the commercialization efforts and successes of the small business. List projects or technology areas in which commercial products or services have been sold to the private sector or government.

o. Agreement between the Small Business and Research Institution. The small business, before receiving an STTR award, must negotiate a written agreement between the small business and the research institution allocating intellectual property rights and rights, if any, to carry out follow-on research, development, or commercialization. The small business must submit this agreement to the awarding agency on request and certify in all proposals that the agreement is satisfactory to the small business. The agreement should, as a minimum, state:

- (1) specifically the degree of responsibility and ownership of any product, process, or other invention or innovation resulting from the cooperative research. The degree of responsibility shall include responsibility for expenses and liability, and the

degree of ownership shall also include the specific rights to revenues and profits.

- (2) which party may obtain U.S. or foreign patents or otherwise protect any inventions resulting from the cooperative research.
- (3) which party has the right to any continuation of research including non-STTR follow-on awards.

See Reference A for a guideline or model for such an agreement.

The Federal government will not normally be party to any agreement between the small business concern and the research institution. Nothing in the agreement is to conflict with any provisions setting forth the respective rights of the United States and the small business with respect to intellectual property rights and with respect to any right to carry out follow-on research. All agreements between the small business and the research institution cooperating in the STTR projects, or any business plans reflecting agreements and responsibilities between the parties during the performance of Phase I or II, or for the commercialization of the resulting technology, shall reflect the controlling position of the small business.

3.5 Bindings

Do not use special bindings or cover. Staple the pages in the upper left hand corner of each proposal.

3.6 Phase II Proposal

This solicitation is for Phase I only. A Phase II proposal can be submitted only by a Phase I awardee and only in response to a request from the agency; that is, Phase II is not initiated by a solicitation. Each proposal must contain a Red Cover Sheet (Appendix A) and a Red Project Summary Sheet (Appendix B). Copies of Appendices along with instructions regarding Phase II proposal preparation and submission will be provided by the DoD Components to all Phase I winners at time of Phase I contract award.

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

4.1 Introduction

Phase I proposals will be evaluated on a competitive basis and will be considered to be binding for six (6) months from the date of closing of this solicitation unless offeror states otherwise. If selection has not been made prior to the proposal's expiration date, offerors will be requested as to whether or not they want to extend their proposal for an additional period of time. Proposals meeting stated solicitation requirements will be evaluated by scientists or engineers knowledgeable in the topic area.

Proposals will be evaluated first on their relevance to the chosen topic. Those found to be relevant will then be evaluated using the criteria listed in Section 4.2. Final decisions will be made by the DoD Component based upon these criteria and consideration of other factors including possible duplication of other work, and program balance. A DoD Component 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 DoD

Components to make any awards on any topic, to make a specific number of awards or to be responsible for any monies expended by the proposer before award of a contract.

For proposals that have been selected for contract award, a Government Contracting Officer will draw up an appropriate contract to be signed by both parties before work begins. Any negotiations that may be necessary will be conducted between the offeror and the Government Contracting Officer. It should be noted that only a duly appointed contracting officer has the authority to enter into a contract on behalf of the U.S. Government.

Phase II proposals will be subject to a technical review process similar to Phase I. Final decisions will be made by DoD Components based upon the 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 DoD.

Upon written request and after final award decisions have been announced, a debriefing will be provided to unsuccessful offerors on their proposals.

4.2 Evaluation Criteria - Phase I

The DoD Components plan to select for award those proposals offering the best value to the government and the nation considering the following factors.

- a. The soundness and technical merit of the proposed approach and its incremental progress toward topic or subtopic solution
- b. The potential for commercial (government or private sector) application and the benefits expected to accrue from this commercialization
- c. The adequacy of the proposed effort for the fulfillment of requirements of the research topic
- d. The qualifications of the proposed principal/key investigator, supporting staff and researchers from the research institution. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.

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, etc., should be contained or referenced in the proposal.

4.3 Evaluation Criteria - Phase II

The Phase II proposal will be reviewed for overall merit based upon the criteria below.

- a. The soundness and technical merit of the proposed approach and its incremental progress toward topic or subtopic solution
- b. The potential for commercial (government or private sector) application and the benefits expected to accrue from this commercialization
- c. The adequacy of the proposed effort for the fulfillment of requirements of the research topic
- d. The qualifications of the proposed principal/key investigator, supporting staff and researchers from the research institution. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.

A proposal's commercial potential can be evidenced by:

- (1) the small business concern's record of commercializing STTR or other research,
- (2) the existence of second phase funding commitments from private sector or non-STTR government funding sources,
- (3) the existence of third phase follow-on commitments for the subject of the research, or
- (4) the presence of other indicators of commercial potential of the idea.

The reasonableness of the proposed costs 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.

The follow-on funding commitment must provide that a specific amount of Phase III funds will be made available to or by the small business and indicate the dates the funds will be made available. It must also contain specific technical objectives which, if achieved in Phase II, will make the commitment exercisable by the small business. The terms cannot be contingent upon the obtaining of a patent due to the length of time this process requires. The funding commitment shall be submitted with the Phase II proposal.

Phase II proposal evaluation may include on-site evaluations of the Phase I effort by government personnel.

5.0 CONTRACTUAL CONSIDERATIONS

Note: Eligibility and Limitation Requirements (Section 1.4) Will Be Enforced

5.1 Awards (Phase I)

a. Number of Phase I Awards. The number of Phase I awards will be consistent with the agency's RDT&E budget, the number of anticipated awards for interim Phase I modifications, and the number of anticipated Phase II contracts. No Phase I contracts will be awarded until all qualified proposals (received in accordance with Section 6.2) on a specific topic have been evaluated. All proposers will be notified of selection/non-selection status for a Phase I award no later than October 1, 1994. The name of those firms selected for awards will be announced. *The DoD Components anticipate making 100 Phase I awards from this solicitation.*

b. Type of Funding Agreement. All winning proposals will be funded under negotiated contracts and may include a fee or profit. The firm fixed price or cost plus fixed fee type contract will be used for all Phase I projects (see Section 5.4). *Note: The firm fixed price contract is the preferred type for Phase I.*

c. Average Dollar Value of Awards. DoD Components will make Phase I awards to small businesses typically on a one-half person-year effort over a period generally not to exceed one year (subject to negotiation). PL 102-564 allows agencies to award Phase I contracts up to \$100,000 without justification. Where applicable, specific funding instructions are contained in Section 8 for each DoD Component.

5.2 Awards (Phase II)

a. Number of Phase II Awards. The number of Phase II awards will depend upon the results of the Phase I efforts and the availability of funds. *The DoD anticipates that approximately 40 percent of its Phase I awards will result in Phase II projects.*

b. Type of Funding Agreement. Each Phase II proposal selected for award will be funded under a negotiated contract and may include a fee or profit.

c. Project Continuity. Phase II proposers who wish to maintain project continuity must submit proposals no later than 30 days prior to the expiration date of the Phase I contract and must identify in their proposal the work to be performed for the first four months of the Phase II effort and the costs associated therewith. *These Phase II proposers may be issued a modification to the Phase I contract, at the discretion of the government,* covering an

interim period not to exceed four months for preliminary Phase II work while the total Phase II proposal is being evaluated and a contract is negotiated. This modification would normally become effective at the completion of Phase I or as soon thereafter as possible. Funding, scope of work, and length of performance for this interim period will be subject to negotiations. Issuance of a contract modification for the interim period does not commit the government to award a Phase II contract. See special instructions for each DoD Component in Section 8.

d. Average Dollar Value of Awards. Phase II awards will be made to small businesses based on results of the Phase I efforts and the scientific, technical, and commercial merit of the Phase II proposal. Average Phase II awards will typically cover 2 to 5 person-years of effort over a period generally not to exceed 24 months (subject to negotiation). PL 102-564 states that the Phase II awards may be up to \$500,000 each without justification. Specific instructions are provided by each DoD Component in Section 8.

5.3 Reports

a. Content. A final report is required for each Phase I project. The report must contain in detail the project objectives, work performed, results obtained, and estimates of technical feasibility. A completed SF 298, "Report Documentation Page", will be used as the first page of the report. In addition, Monthly status and progress reports may be required by the DoD Component. (A Sample SF 298 is provided in Reference D.)

b. Preparation.

- (1) To avoid duplication of effort, language used to report Phase I progress in a Phase II proposal, if submitted, may be used verbatim in the final report with changes to accommodate results after Phase II proposal submission and modifications required to integrate the final report into a self-contained comprehensive and logically structured document.
- (2) Block 12a (Distribution/Availability Statement) of the SF298, "Report Documentation Page" in each unclassified final report must contain one of the following statements:
 - (a) Distribution authorized to U.S. Government Agencies only; report contains proprietary data produced under STTR contract. Other requests shall be referred to the performing organization in Block 7 of this form.

- (b) Approved for public release; STTR report, distribution unlimited.
- (3) The report abstract (Block 13 of the SF 298, "Report Documentation Page") must identify the purpose of the work and briefly describe the work carried out, the finding or results and the potential applications of the effort. The abstract may be published by the DoD.

c. **Submission.** SIX COPIES of the final report on each Phase I project shall be submitted within the DoD in accordance with the negotiated delivery schedule. Delivery will normally be within thirty days after completion of the Phase I technical effort. One copy of each unclassified report shall be delivered directly to the DTIC, ATTN: Document Acquisition, Cameron Station, Alexandria, VA 22304-6145.

5.4 Payment Schedule

The specific payment schedule (including payment amounts) for each contract will be incorporated into the contract upon completion of negotiations between the DoD and the successful Phase I or Phase II offeror. Successful offerors may be paid periodically as work progresses in accordance with the negotiated price and payment schedule. Phase I contracts are primarily fixed price contracts, under which monthly progress payments may be made up to 90% of the contract price excluding fee or profit. The contract may include a separate provision for payment of a fee or profit. Final payment will follow completion of contract performance and acceptance of all work required under the contract. Other types of financial assistance may be available under the contract.

5.5 Markings of Proprietary or Classified Proposal Information

The proposal submitted in response to this solicitation may contain technical and other data which the proposer does not want disclosed to the public or used by the government for any purpose other than proposal evaluation.

Information contained in unsuccessful proposals will remain the property of the proposer except for Appendices A and B. The government may, however, retain copies of all proposals. Public release of information in any proposal submitted will be subject to existing statutory and regulatory requirements.

If proprietary information is provided by a proposer in a proposal which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting the national security, it will be treated in confidence, to the extent permitted by law, provided this information is clearly marked by the proposer with the term "confidential proprietary information" and provided that the following legend which appears on the

title page (Appendix A) of the proposal is completed:

"For any purpose other than to evaluate the proposal, this data except Appendix A and B shall not be disclosed outside the government and shall not be duplicated, used, or disclosed in whole or in part, provided that if a contract is awarded to the proposer as a result of or in connection with the submission of this data, the government shall have the right to duplicate, use or disclose the data to the extent provided in the contract. This restriction does not limit the government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction is contained in page(s) _____ of this proposal."

Any other legend may be unacceptable to the government and may constitute grounds for removing the proposal from further consideration and without assuming any liability for inadvertent disclosure. The government will limit dissemination of properly marked information to within official channels.

In addition, each page of the proposal containing proprietary data which the proposer wishes to restrict must be marked with the following legend:

"Use or disclosure of the proposal data on lines specifically identified by asterisk (*) are subject to the restriction on the cover page of this proposal."

The government assumes no liability for disclosure or use of unmarked data and may use or disclose such data for any purpose.

In the event properly marked data contained in a proposal in response to this solicitation is requested pursuant to the Freedom of Information Act, 5 USC 552, the proposer will be advised of such request and prior to such release of information will be requested to expeditiously submit to the DoD Component a detailed listing of all information in the proposal which the proposer believes to be exempt from disclosure under the Act. Such action and cooperation on the part of the proposer will ensure that any information released by the DoD Component pursuant to the Act is properly determined.

Those proposers that have a classified facility clearance may submit classified material with their proposal. Any classified material shall be marked and handled in accordance with applicable regulations. Arbitrary and unwarranted use of this restriction is discouraged. Offerors must follow the Industrial Security Manual for Safeguarding Classified Information (DoD 5220.22M) procedures for marking and handling classified material.

5.6 Copyrights

To the extent permitted by statute, the awardee may copyright (consistent with appropriate national security considerations, if any) material developed with DoD support. DoD receives a royalty-free license for the Federal Government and requires that each publication contain an appropriate acknowledgement and disclaimer statement.

5.7 Patents

Small business firms normally may retain the principal worldwide patent rights to any invention developed with government support. The government receives a royalty-free license for its use, reserves the right to require the patent holder to license others in certain limited circumstances, and requires that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. To the extent authorized by 35 USC 205, the government will not make public any information disclosing a government-supported invention for a reasonable time period to allow the awardee to pursue a patent.

5.8 Technical Data Rights

Rights in technical data, including software, developed under the terms of any contract resulting from proposals submitted in response to this solicitation shall remain with the contractor, except that the government shall have the limited right to use such data for government purposes and shall not release such data outside the government without permission of the contractor for a period of four years from completion of the project from which the data was generated unless the data has already been released to the general public. However, effective at the conclusion of the four-year period, the government shall retain a royalty-free license for government use of any technical data delivered under an STTR contract whether patented or not.

5.9 Cost Sharing

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

5.10 Joint Ventures or Limited Partnerships

Joint ventures and limited partnerships are eligible provided the entity created qualifies as a small business as defined in Section 2.2 of this solicitation.

5.11 Research and Analytical Work

For Phase I and II, a minimum of 40 percent of the research and/or analytical effort must be performed by the proposing firm and a minimum of 30 percent performed by the research institution unless otherwise approved in writing by the contracting officer.

5.12 Contractor Commitments

Upon award of a contract, the contractor will be required to make certain legal commitments through acceptance of government contract clauses in the Phase I contract. The outline that follows is illustrative of the types of provisions required by the Federal Acquisition Regulations that will be included in the Phase I contract. This is not a complete list of provisions to be included in Phase I contracts, nor does it contain specific wording of these clauses. Copies of complete general provisions will be made available prior to award.

a. **Standards of Work.** Work performed under the contract must conform to high professional standards.

b. **Inspection.** Work performed under the contract is subject to government inspection and evaluation at all reasonable times.

c. **Examination of Records.** The Comptroller General (or a fully authorized representative) shall have the right to examine any directly pertinent records of the contractor involving transactions related to this contract.

d. **Default.** The government may terminate the contract if the contractor fails to perform the work contracted.

e. **Termination for Convenience.** The contract may be terminated at any time by the government if it deems termination to be in its best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.

f. **Disputes.** Any dispute concerning the contract which cannot be resolved by agreement shall be decided by the contracting officer with right of appeal.

g. **Contract Work Hours.** The contractor may not require an employee to work more than eight hours a day or forty hours a week unless the employee is compensated accordingly (that is, receives overtime pay).

h. **Equal Opportunity.** The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.

i. **Affirmative Action for Veterans.** The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.

j. **Affirmative Action for Handicapped.** The contractor will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.

k. **Officials Not to Benefit.** No member of or delegate to Congress shall benefit from the contract.

l. **Covenant Against Contingent Fees.** No person or agency has been employed to solicit or secure the contract upon an understanding for compensation except bona fide employees or commercial agencies maintained by the contractor for the purpose of securing business.

m. **Gratuities.** The contract may be terminated by the government if any gratuities have been offered to any representative of the government to secure the contract.

n. **Patent Infringement.** The contractor shall report each notice or claim of patent infringement based on the performance of the contract.

o. **Military Security Requirements.** The contractor shall safeguard any classified information associated with the contracted work in accordance with applicable regulations.

p. **American Made Equipment and Products.** When purchasing equipment or a product under the STTR funding agreement, purchase only American-made items whenever possible.

5.13 Additional Information

a. **General.** This Program Solicitation is intended for

information purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting STTR contract, the terms of the contract are controlling.

b. **Small Business Data.** Before award of an STTR contract, the government may request the proposer to submit certain organizational, management, personnel, and financial information to confirm responsibility of the proposer.

c. **Proposal Preparation Costs.** The government is not responsible for any monies expended by the proposer before award of any contract.

d. **Government Obligations.** This Program Solicitation is not an offer by the government and does not obligate the government to make any specific number of awards. Also, awards under this program are contingent upon the availability of funds.

e. **Unsolicited Proposals.** The STTR Program is not a substitute for existing unsolicited proposal mechanisms. Unsolicited proposals will not be accepted under the STTR Program in either Phase I or Phase II.

f. **Duplication of Work.** If an award is made pursuant to a proposal submitted under this Program Solicitation, the contractor will be required to certify that he or she has not previously been, nor is currently being, paid for essentially equivalent work by an agency of the Federal Government.

g. **Classified Proposals.** If classified work is proposed or classified information is involved, the offeror to the solicitation must have, or obtain, security clearance in accordance with the Industrial Security Manual for Safeguarding Classified Information (DoD 5220.22M).

6.0 SUBMISSION OF PROPOSALS

An original plus (4) copies of each proposal or modification will be submitted, in a single package, as described below, unless otherwise stated by specific instructions in Section 8.0.

NOTE: THE ORIGINAL OF EACH PROPOSAL MUST CONTAIN A COMPLETED RED COPY OF APPENDIX A (COVER SHEET) AND APPENDIX B (PROJECT SUMMARY), AND A COMPANY COMMERCIALIZATION REPORT (see Section 3.4.n).

6.1 Address

Each proposal or modification package must be addressed to that DoD Component address which is identified for the specific topic in that Component's subsection of Section 8.0 to this solicitation.

The name and address of the offeror, the solicitation number and the topic number for the proposal must be clearly marked on the face of the envelope or wrapper.

Mailed or handcarried proposals must be delivered to the address indicated for each topic. Secured packaging is

mandatory. The DoD Component cannot be responsible for the processing of proposals damaged in transit.

All copies of a proposal must be sent in the same package. Do not send separate information copies or several packages containing parts of the single proposal.

6.2 Deadline of Proposals

Deadline for receipt of proposals at the DoD Component is 2:00 p.m. local time, April 1, 1994. Any proposal received at the office designated in the solicitation 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 23, 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.

Note: There are no other provisions for late receipt of proposals under this solicitation.

The only acceptable evidence to establish (a) the date of mailing of a late-received proposal sent either by registered mail or certified mail is the U. S. Postal Service postmark on the wrapper or on the original receipt from the U. S. Postal Service. If neither postmark shows a legible date, the proposal shall be deemed to have been mailed late. The term postmark means a printed, stamped, or otherwise placed impression (exclusive of a postage meter machine impression) that is readily identifiable without further action as having been supplied and affixed on the date of mailing by employees of the U. S. Postal Service. Therefore, offerors should request the postal clerk to place a hand cancellation bull's-eye postmark on both the receipt and the envelope or wrapper; (b) the time of receipt at the government installation is the time-date stamp of such installation on the proposal wrapper or other documentary evidence of receipt maintained by the installation.

Proposals may be withdrawn by written notice or a telegram received at any time prior to award. Proposals may also be withdrawn in person by an offeror or his authorized representative, provided his identity is made

known and he signs a receipt for the proposal. (NOTE: the term telegram includes mailgrams.)

Any modification or withdrawal of a proposal is subject to the same conditions outlined above. Any modification may not make the proposal longer than 25 pages (excluding company commercialization record). Notwithstanding the above, a late modification of an otherwise successful proposal which makes its terms more favorable to the government will be considered at any time it is received and may be accepted.

6.3 Notification of Proposal Receipt

Proposers desiring notification of receipt of their proposal must complete and include a self-addressed stamped envelope and a copy of the notification form (Reference B) in the back of this brochure. If multiple proposals are submitted, a separate form and envelope is required for each. Notification of receipt of a proposal by the government does not by itself constitute a determination that the proposal was received on time or not. The determination of timeliness is solely governed by the criteria set forth in Section 6.2.

6.4 Information on Proposal Status

Evaluation of proposals and award of contracts will be expedited, but no information on proposal status will be available until the final selection is made. However, contracting officers may contact any and all qualified proposers prior to contract award.

6.5 Debriefing of Unsuccessful Offerors

Upon written request and after final award decisions have been announced, a debriefing will be provided to unsuccessful offerors for their proposals.

6.6 Correspondence Relating to Proposals

All correspondence relating to proposals should cite the STTR solicitation number and specific topic number and should be addressed to the DoD Component whose address is associated with the specific topic number.

7.0 SCIENTIFIC AND TECHNICAL INFORMATION ASSISTANCE

7.1 DoD Technical Information Services Available

The Defense Technical Information Center (DTIC), the central source of scientific and technical information resulting from and describing research and development projects funded by DoD, is a major component of the DoD Scientific and Technical Information Program. DTIC

provides access to and transfer of scientific and technical information for DoD personnel, DoD contractors, and other U.S. Government agencies and their contractors.

It is anticipated that participants in the STTR program will have direct access to DTIC as current Federal contractors, potential defense contractors, or access through partnership with an institution eligible to receive DTIC

services.

The scientific and technical information assistance provided by DTIC enables organizations preparing R&D proposals to DoD to make better informed bid decisions and to make technically stronger submittals. Respondents to this solicitation are encouraged to ascertain their organization's authorization to use DTIC and, if eligible, to request bibliographies of technical reports that have resulted from DoD-funded R&D in their proposal topic areas and copies of the technical reports cited in the bibliographies. Information should also be requested about topic related DoD-sponsored work in progress.

Call, or visit (by pre-arrangement), DTIC at the location most convenient to you:

Defense Technical Information Center
ATTN: DTIC-User Services
Building 5, Cameron Station
Alexandria, VA 22304-6145
(800) 225-3842
(703) 274-9274 (FAX)

DTIC Boston Regional Office
Building 1103, 5 Wright Street
Hanscom AFB
Bedford, MA 01731-5000
(617) 377-2413

DTIC Albuquerque Regional Office
PL/SUL
3550 Aberdeen Ave, SE
Kirtland AFB, NM 87117-6008
(505) 846-6797

DTIC Los Angeles Regional Office
222 N. Sepulveda Blvd., Suite 906
El Segundo, CA 90245-4320
(310) 335-4170

For information services in the areas of manpower, personnel, training and simulation devices, human factors and safety, contact the DTIC Manpower and Training Research Information System:

DTIC MATRIS Office
San Diego, CA 92152-6800
(619) 553-7008

DTIC also provides access to DoD-sponsored Centers for Analysis of Scientific and Technical Information (IACs), offering DTIC users specialized reference services and subject matter expertise. IACs are concerned with the Scientific and Technical Information content of worldwide engineering, technical and scientific documents and databases. They receive technical management and direction from the DoD organizations with leading

competence in the science and technology area within which each IAC functions. DTIC-managed IACs and their subject areas are as follows:

Chemical Propulsion Information Agency, CPIA

Data and Analysis Center for Software, DACS

Guidance and Control IAC, GACIAC

Infrared Information Analysis Center, IRIA

Metals Information Analysis Center, MIAC

Ceramics Information Analysis Center, CIAC

Metal Matrix Composites IAC, MMCIAC

Nondestructive Testing IAC, NTIAC

Reliability Analysis Center, RAC

High Temperature Materials IAC, HTMIAC

Manufacturing Technology IAC, MTIAC

Survivability/Vulnerability IAC, SURVIAC

Chemical Warfare/Chemical Biological Defense IAC, CBIAC

Crew System Ergonomics IAC, CSERIAC

For more information about the DTIC IAC program and other DoD IACs contact:

Defense Technical Information Center
DTIC-IAC Program Manager
Alexandria, VA 22304-6145
(703) 274-6260
(703) 274-0980 (FAX)

7.2 Other Technical Information Assistance Sources

Other sources provide technology search and/or document services and can be contacted directly for service and cost information. These include:

National Technical Information Services
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4600
(703) 321-8547 (FAX)

National Technology Transfer Center
Wheeling Jesuit College
316 Washington Ave
Wheeling, WV 26003
(800) 678-6882 (all services at no cost)

7.3 DoD Counseling Assistance Available

Small business firms interested in participating in the STTR Program may seek general administrative guidance from small and disadvantaged business utilization specialists

located in various Defense Contract Management activities throughout the continental United States. These specialists are available to discuss general administrative requirements to facilitate the submission of proposals and ease the entry of the small high technology business into the Department of Defense marketplace. The small and disadvantaged business utilization specialists are expressly prohibited from taking any action which would give an offeror an unfair advantage over others, such as discussing or explaining the technical requirements of the solicitation, writing or discussing technical or cost proposals, estimating cost or any other actions which are the offerors responsibility as outlined in this solicitation. (See Reference C at the end of this solicitation for a complete listing, with telephone numbers, of Small and Disadvantaged Business Utilization Specialists assigned to these activities.)

7.4 State Assistance Available

Many states have established programs to provide services to those small firms and individuals wishing to participate in the Federal STTR Program. These services vary from state to state, but may include:

- Information and technical assistance;
- Matching funds to STTR recipients;
- Assistance in obtaining Phase III funding.

Contact your State Government Office of Economic Development for further information.

8.0 TECHNICAL TOPICS

Section 8 contains detailed topic descriptions outlining the technical problems for which DoD Components requests proposals for innovative R&D solutions from small businesses. Topics for each participating DoD Component are listed and numbered separately. Each DoD Component Topic Section contains topic descriptions, addresses of organizations to which proposals are to be submitted, and special instructions for preparing and submitting proposals to organizations within the component. Read and follow these instructions carefully to help avoid administrative rejection of your proposal.

<u>Component Topic Sections</u>	<u>Pages</u>
Army	ARMY 1-4
Navy	NAVY 1-3
Air Force	AF 1-3
Advance Research Projects Agency	ARPA 1-6
Ballistic Missile Defense Organization	BMDO 1-2

ARMY

Submission of Proposals

The responsibility for the implementation, administration, and management of the U.S. Army STTR Program rests with the Army SBIR/STTR Program Management Office. The Army STTR Program Manager is Mr. Joseph P. Forry. You are invited to send your proposals directly to the following address:

Commander
U.S. Army Materiel Command
ATTN: AMCRD-SBIR (J. Forry)
5001 Eisenhower Avenue
Alexandria, VA 22333
(703) 617-7425

The Army has identified three technical topics, numbered ARMY 94T001 through ARMY 94T003, to which small businesses and their partner research institutes may respond. Please note that these are the only topics for which proposals will be accepted at this time.

The three Army STTR topics presented on the following pages were generated by Army technical organizations in technology areas contained in the Military Critical Technology Listing. Selection of Phase I proposals for funding is based upon technical merit and the evaluation criteria contained in this solicitation document. Due to limited funding, the Army will only fund those proposals which are of superior technical quality and which present excellent opportunities for dual use and commercialization beyond STTR-funded projects.

Please note that the Army will be limiting Phase I awards to \$100,000. Any Phase II contracts resulting from these Phase I efforts will be limited to \$500,000.

DESCRIPTION: Opportunities for exploiting computer and simulation technologies come from a variety of sources. These include the need for a more efficient military in times of decreasing sizes and budgets; the need to design increasingly sophisticated and complex systems required to support training; the need for complex distributed networks for decision making; the need for the real-time integration of battlefield intelligence to support tactical decisions at all levels; the need to analyze data and identify patterns obtained from diverse sensor sources in the contexts of battlefield intelligence, environmental monitoring, and maintenance diagnostics; the need for more efficient operation of vehicles and other equipment; and the need for the intelligent control of machines required to support advanced manufacturing processes.

A more efficient but smaller military will necessitate improvements in training. Training systems such as the Multiple Integrated Laser Engagement System II (MILES II) and the envisioned follow-on MILES 2000, will provide live simulation, with real equipment and real soldiers but simulated ordnance of indirect fire, area weapons effects, fire and forget weaponry, and directed energy weapons. Sensor devices and computer techniques are needed to record and analyze the status and results of the simulations.

Devices and techniques are also required based on computer-generated virtual reality to support the training of both individual soldiers and field commanders, thus providing the capability of extensive and ongoing training without incurring the higher costs and logistic complexities of live simulations.

Systems of systems (sometimes called supersystems) will become more prevalent in military systems of the future. These super systems are made up of integrated networks of communications and processing systems with contained data bases, and are typically large, distributed, and heterogeneous. Time scales may vary from microseconds to weeks. Because of their complexity and cost, the design of these supersystems requires extensive modeling, simulation, and analysis. New and innovative approaches are needed to address modeling at the physical phenomenon level, the system behavior and performance level, and the operational level in an integrated way.

Computerized techniques are needed to provide tactical commanders with the ability to visualize the battlefield in an easily understandable, three-dimensional perspective that could include information about terrain, environment, and friendly and enemy maneuvers.

Increasing national concern for possible damage to the environment resulting from military activities will require improved techniques for environmental monitoring. Included in these will be computer based techniques for combining data and imagery from multiple sources to perform near-real-time weather analysis, automated terrain reasoning, modeling of terrain background and environmental signatures and the development of comprehensive environmental data.

Fuel-efficient, low pollutant-emission operation of military vehicles will require computerized control based on advanced control algorithms and sensors. Control techniques that appear especially promising are based on artificial intelligence that use instantaneous measurements of in-cylinder engine parameters and novel fuel control systems. Some possible control architectures might be model-based control, rule-based control, fuzzy logic, genetic algorithms, and hybrid (symbolic and numeric) control.

Intelligent manufacturing is becoming critical to both our national defense and our international industrial competitiveness. Sensors, particularly non-contact sensors such as vision systems, are essential ingredients of intelligent manufacturing machines. Often the most effective sensing strategy for a particular process may involve the use of data from many different types of sensors.

Although a number of basic approaches to problems in computer vision and data fusion have been developed, there remain a great many areas in which the present algorithms do not give robust answers. Much additional work on modeling and analysis will be required. Of particular value will be principles, processes, and models that are universal or at least reusable. Examples of required developments can be found in software that can provide an improved geometric environment for editing and manipulating geometric entities in three dimensions. Representative applications would be to geometric models of the kinematics of material transfer, robotics, machine tools, and solid modeling.

DESCRIPTION: There is a broad need for diverse research and development of sensing devices and techniques in support of a variety of military and private sector applications. The following paragraphs discuss several of our needs.

Improved lidar systems are needed to detect atmospheric turbulence that has caused military and civilian aircraft to crash upon takeoff or landing at airports. Specifically, aircraft mounted lidar systems are needed that can detect downbursts, especially when rain is not present. The lidar systems need to operate near 2 micrometers in order to be eye-safe. Previous studies have suggested that it is possible to build such devices with a capability of sampling wind distribution in a volume approximately 4 km on a side of 1.5 km high at a 30 m resolution every two minutes. The system would be capable of sampling very near the ground as well as aloft (which radar cannot). High precision measurements would improve accuracy of military air drops, as well as contribute to weather forecasting, and improving aircraft safety. Emphasis in development should be on both miniaturization of the sensing and processing system and development of eye safe lidar to measure the spatial structure of the wind velocity fields at scales of tens of meters and times on the order of tens of seconds.

Improved diffractive optical systems are needed which take advantage of recently developed manufacturing techniques developed by the microelectronics industry, using diamond turning, that have allowed the manufacture of general surface relief diffractive optics. A broad range of applications for such optical systems are needed. Diffractive optics can be used to produce anti-reflection structures, needed by the military for low observable (Stealth) application, and by the private sector to reduce infrared reflections where available materials restrict the use of conventional thin film techniques. Hybrid diffractive/refractive optical systems have been used to produce bifocal contact and intraocular lenses. Designs have been made for achromatic hybrid doublets and triplets in the visible, especially for wide field imaging applications. Designs have been made for infrared applications such as Petzval lenses. A novel application utilizes diffractive micro-lenses to improve the efficiency of staring and scanning infrared images. Diffractive optics, used with lasers, can lead to lighter and more efficient CD player optics, and to inexpensive head-ups displays for automotive applications.

Potentially very inexpensive uncooled infrared focal-plane-array (IRFPA) images have recently been demonstrated to be competitive in many applications with the expensive cooled IRFPA images, previously used in military systems. Civilian applications have been limited by cost, but include: driver's aides for augmenting night vision beyond the range of headlights and insensitivity to the blinding effects of oncoming headlights; pilot aides for landing at night or in fog; fire fighting for search and rescue through smoke or dark and for localization of the seat of the flames for fire suppression; perimeter surveillance for security systems, law enforcement; nondestructive material testing, and manufacturing applications such as process control. Recent progress indicates that IRFPA imagers have the potential to provide outstanding performance at a cost approaching those of home video cameras. Sensitivities have already been demonstrated which are more than sufficient for most civilian application, and resolution has been demonstrated approaching that of the standard TV format. A broad range of devices and techniques using this new technology is needed.

Development is needed of millimeter-wave electronic devices that are low-power, more easily manufactured than present devices, and affordable for civilian as well as military applications. The rapid development of modern MIC technology has resulted in significant fabrication cost reductions, making practical millimeter-wave systems possible. However, current systems operate at ever-higher frequencies, and operate with low DC-to-RF conversion efficiency, which places severe demands on DC power sources. Improved devices would have a variety of potential applications. For example, the US Army plans to develop a variety of electronic equipment for individual soldier use. Each soldier, tank, etc. would have individual communications, surveillance, and other equipment. Much of this equipment will operate at microwave and millimeter-wave frequencies. Since battery power storage is fundamentally limited, the desired electronic equipment will be possible only by reducing prime power requirement through development of low power/high efficiency millimeter-wave electronics. Civilian applications would include high capacity, light weight personal communications systems.

DESCRIPTION: Development of advanced materials and innovative, cost effective approaches for processing and incorporating materials in combat systems is essential to meet future battlefield requirements for a more capable "lethal light" and deployable (lighter) "heavy" force. Future land combat forces must be light-weight, highly maneuverable, hard to detect, lethal, and survivable. Integrated systems of active and passive signature control and obscuration, active countermeasures, sensors, communications, and extremely light-weight armor demand advanced materials solutions to meet performance requirements and ensure reliability, durability, and sustainability. Novel synthesis, processing, and characterization techniques, as well as fundamental developments in basic theory, computational/predictive modeling, testing, evaluation and design are needed to develop, assess, and exploit advanced materials and composite/hybrid materials options.

For example, better techniques are needed for processing, characterizing, testing, and specifying thick-section composite materials for vehicle structures. The design and integration of signature control and armor protection into composite structures needs to be addressed, along with durability, survivability, repairability, and affordability. Other materials requirements include: improved lightweight armor materials for personnel equipment and light vehicle protection (toughened ceramic armor plates, thick section composites); advanced tungsten heavy alloys for kinetic energy penetrators; lightweight composite and hybrid materials with high specific strength and environmental durability for structural applications in bridging and weapons platforms; improved mechanical/physical characterization techniques (including ballistic performance, dynamic response, and low impact behavior) for thick section composite materials; NDE techniques for assessing thick section composites and monitoring fiber placement in composite materials; intelligent, automated control and inspection systems for materials processing and fabrication; adhesive bonding of structural composite/hybrid materials; ceramic-ceramic joining; heat resistant ceramic or ceramic matrix composite materials for use as gun-chamber liners and KE penetrator stabilizer fins, tips, and leading edges; low cost, ceramic thermal barrier coatings for gas turbine blades and advanced diesel engine components; high-temperature titanium aluminide and Al-Fe alloys for aircraft and missile engines; environmentally compliant coatings for camouflage, munitions, and chemical agent protection; improved rubber for track, bushings, and roadwheel components; electro-optical/laser (broadband, agile) protective materials for use in individual eye protection, vehicle vision blocks, electro-optic devices and aircraft canopies; thin film polymer/ceramic composite piezoelectric and pyroelectric smart sensors; signature reduction materials and low observable structural materials (radar, visual, and infrared countermeasures) and design schemes for integration in ground vehicles; transparent materials for low observable applications; flexible barrier coatings and laminates for chemical protective clothing and shelters; smart materials which are tunable to survive through measures such as load re-distribution after damage, are responsive to monitor and evaluate the effects of environmental or battle damage, and are active in transforming and proportioning electromagnetic to mechanical energy or vice versa. Additionally needed, is practical development of net-shape forming of ceramic components using gas pressure superplastic deformation and development of recyclable, self-reinforcing polymeric composites produced by extruding liquid crystal polymers blended with thermoplastics.

NAVY

Proposal Submission

The responsibility for the implementation, administration and management of the Navy STTR program is with the Office of Naval Research. The Navy STTR Program Manager is Mr. Vincent D. Schaper. Inquiries of a general nature may be brought to the Navy STTR Program Manager's attention and should be addressed to:

Office of Naval Research
ATTN: Mr. Vincent D. Schaper
ONR 412 E
800 North Quincy Street
Arlington, VA 22217-5660
(703) 696-4286

All STTR proposals submitted in response to a Navy STTR topic should be sent to the above address.

This solicitation contains three technical topics that meet the mission requirements of the Navy and PL 102-564 to which small R&D businesses together with a research institution may respond. As in SBIR solicitations the Navy will provide potential awardees the opportunity to reduce the gap between phases I & II by providing a \$70,000 Phase I proposal award and a \$30,000 Phase I Option award or may elect to just submit a Phase I proposal for \$100,000. If an awardee chose the former, the Option effort should form the initial part of the Phase II work. If a potential awardee chooses the later, recognize that: 1) they forfeit the ability to reduce the gap and 2) risk the possibility of losing an award if there exists a tie with a lower priced proposal (see sections 4.2 and 4.3, Evaluation Criteria). Only an awardee whose Phase II proposal has been recommended and selected for award will be funded for the Phase I Option. Therefore, those who have finished or almost finished their Phase I and asked to submit their Phase II proposal should do so. The Phase II proposal should contain three elements: 1) a plan of how the proposer will commercialize the technology to the government and the private sector; 2) a Phase II work plan; and 3) a Phase II option. At the end of the Phase II portion, a determination will be made by the Navy as to whether the proposer has satisfied the commercialization plan sufficiently for the government to fund the "Phase II option" portion of the proposal. The Phase II option should address the further R&D or test and evaluation aspects of the proposal. The total Phase II funding should not exceed \$500,000 with 80% going to the Phase II and 20% for the "option Phase II".

Selection of Phase I proposals is based upon technical merit and evaluation criteria contained in this solicitation document. Due to limited funding, the Navy reserves the right to limit awards under any topic and only those proposals considered to be of superior quality will be funded.

NAVY 94T001 Title: Electronic Components & Systems\Electronics

DESCRIPTION: Solid state electronic materials, devices, components, and systems are widely used in many Navy/DoD as well as civilian computer and signal processing systems. New and innovative approaches to developing, designing, and fabricating high performance electronic devices and systems are sought and encouraged. Proposals may be submitted to either the general or specific portion of this topic.

A. General. Innovative approaches in any of the following areas are encouraged.

Materials - Innovative fabrication techniques for making thin atomic layers of solid state materials, and techniques for in-situ monitoring of the growth process are encouraged.

Components - Nanoscale electronic devices are sought, including quantum tunneling devices, quantum wells and multiple quantum wells, mesoscale devices, and single electron transistors.

Sensors - Sensors of various types to detect signals in the acoustic and the entire electromagnetic spectrum ranging from EM, visible light, IR, and UV, are sought, as well as microminiature sensors to detect accelerations, mechanical vibrations, and fractures in materials.

Signal processors - Signal processing architectures to exploit the very large scale integration (VLSI) device technology to achieve real-time signal and image processing are sought.

Computers - Multiprocessor and parallel computer architectures and realizations that are affordable to achieve GOPS in computation throughputs are encouraged.

B. Specific. The Navy recognizes a need for research in the following specific areas.

Materials - Innovative techniques employing MBE, MOCVD, ALE, or Supersonic jets to optimize epitaxial growth of semiconductor materials, including wide bandgap materials.

Devices - Innovative devices using III-V, II-IV, and Group IV semiconductors such as GaAs, AlGaAs, InP, SiGe, SiC, and Diamonds.

Sensors - Multispectral IR sensors such as InTISb and MQW together with on-chip signal processing.

Signal processors - Massively parallel signal processors such as systolic arrays and cellular neural networks for real-time image and signal processing.

NAVY 94T002 TITLE: High Power Semiconductors\Electronics

DESCRIPTION: Significant improvements in cost, weight, and volume can be realized in aircraft, submarines, and other vehicles by replacing hydraulic systems with electronic actuators and drives, but these devices require semiconductor devices capable of handling voltage, current, and thermal loads considerably in excess of conventional silicon, germanium, and gallium arsenide devices. Examples of new semiconductor materials sought include: silicon carbide (2H, 4H, & 3C), gallium nitride, aluminum nitride, boron nitride, and alloys of all of these materials. High Power diodes, Field Effect Transistors (FETs), bipolar transistors, and Heterojunction Bipolar Transistors (HBTs) of these semiconductor materials are expected to be designed and tested in phase II programs.

NAVY 94T003 Title: Signal Processing Chips\Electronics

Description: The processing of complex signals (speech, sonar, vision) is typically addressed via algorithms that are inherently based on serial processing technologies, unsuited to efficient implementation, portability, or real-time performance. However, most contemplated military or industrial applications call for portable, real-time operation (e.g., on-site sonar, speech processing, and image recognition). Recent novel signal processing algorithms have been shown to have characteristics that confer very

good scaling properties [$O(n \log n)$] that lend themselves to very efficient large-scale silicon implementation. Some of the characteristics are derived from biological systems and include: Sparse connectivity, simple learning rules, low-precision operating steps, asynchronous processing, continuous feedback between early and late processes, and the ability to fuse data from one or more sensors. Some of these new algorithms may be derived from specific biological systems (e.g., auditory and visual cortex) or emulate biological processes (e.g., sensor fusion, inhibition, expectation). Low power dissipation and high processing speeds are, of course, an advantage. Design and demonstrate a fully functional prototype signal processing chip.

AIR FORCE

The responsibility for the implementation and management of the Air Force STTR Program is with the Air Force Materiel Command Deputy Chief of Staff for Science & Technology. The Air Force STTR Program Manager is R. Jill Dickman. Do NOT submit STTR proposals to the AF STTR Program Manager under any circumstances. Inquiries of a general nature or problems that require the attention of the Air Force STTR Program Manager should be directed to her at this address:

Department of The Air Force
HQ/AFMC/STXB (R. Jill Dickman)
4375 Chidlaw Rd
Suite 6
Wright-Patterson AFB OH 45433-5006

Information is key to successful proposal preparation and research. Additional technical information is available by contacting the Air Force point of contact sited after the solicitation topic. Another source for technical information is the Defense Technical Information Center (DTIC), see section 7.1 for more details.

For each Phase I proposal, send one original (with red appendices A and B) and three (3) copies to the office designated below. Also, send an additional set of red appendices A and B, which are not stapled or mutilated in any way. Be advised that any overnight delivery may not reach the appropriate desk within one day.

<u>Topic Number</u>	<u>Activity/Mailing Address</u> (Name and number for mailing proposals and for administrative questions)	<u>Contracting Authority</u> (For contractual questions only)
AF 94T001	Wright Laboratory WL/DOR (Gerry Cassidy) 2130 Eighth Street, Suite 1, Building 45 Wright-Patterson AFB OH 45433-7542 (Gerry Cassidy, 513-255-4119)	Terry Rogers or Bruce Miller (513) 255-5830
AF 94T002 thru AF 94T004	Air Force Office of Scientific Research AFOSR/XPP (Chris Hughes) 110 Duncan Avenue, Suite B115 Bolling AFB DC 20332-0001 (Chris Hughes, 202-767-5015)	Harry Haraldsen (202) 767-4990

DESCRIPTION: Aerospace Technology pursued within Wright Laboratory reflects the mission of six directorates: Avionics, Solid State Electronics, Flight Dynamics, Materials, Armament, and Aero Propulsion and Power:

a) Innovative ideas/concepts are sought for sensors technology. Specific examples include intelligent management of all targeting information; increased target detection range using advanced tracking/processing techniques; long-range all-aspect target recognition/identification; automated target cuing; adaptive processing techniques for operation in presence of clutter and electronic warfare environment; advanced affordable sensor designs for passive and active sensors; weapon and sensor integration (including opto-electronic); combined active and passive systems; wind profiling techniques, spectrometry, and pattern based machine learning.

b) New and innovative approaches to a wide range of electronics and electron device disciplines including nanoelectronic structures, component packaging interconnection, and advanced design techniques are requested. New device concepts and feasibility demonstration efforts are sought for high frequency RF signal amplification; logic and electronic processing; ultra-high speed digital switching devices; advanced semiconductor fabrication technology; high speed/density integrated circuit packaging and high-level integration techniques; and computer based tools for microelectronic design.

c) The need exists for conceptual and mathematical methods and models to quantitatively define the sensitivities, benefits and costs of potential new airframe technologies for aircraft of the next century. The models must represent at least the minimum amount of detail to assess the effects of aircraft configuration, observables, materials, structural concepts, airframe-propulsion integration and manufacturing processes on performance, mission-effectiveness, strength, stiffness and life. They must be consistent with existing multidisciplinary computer software such as Air Force Structures Optimization System (ASTROS) or the Multidisciplinary Analysis and Design Industry Consortium (MADIC).

d) Aerospace materials are increasingly critical to the success of modern weapon systems. The requirements placed upon these materials are stringent, necessitating sophisticated control of structures and properties. New approaches are needed to process these materials for use in military and non-military applications. Examples are closed-loop feedback-based control, including sensors; simulation and modeling; advanced deposition techniques; in-process inspection; and control strategies.

e) New and innovative techniques for high-speed image processing are sought in diverse areas such as ultra-high-speed computation and mass storage, mathematical image processing techniques, image compression, high-resolution displays, and algorithm development. Technologies for image processing should address throughput, size, programmability, and cost. Techniques may encompass a broad spectrum of sensor outputs such as electro-optic, infrared, passive/active millimeter wave, radio frequency, and ultrasound. Both military and commercial payoff in areas such as advanced guidance, surveillance, robotics, medical imaging and telemedicine, and remote sensing are expected.

f) Batteries are used everywhere in Air Force ground and air systems, and throughout the civilian sector. Many of them pose problems in manufacturing (mercury and nickel-cadmium, for example) and disposal. Recycling acids, heavy metals, and reactive materials is very expensive and promises to get worse. New and innovative approaches are sought to meet the often conflicting requirements of energy density, shelf life, weight, reliability, safety and environmental compatibility.

Additional technical information packets for each subtopic may be obtained by calling Gerry Cassidy, 513-255-4119.

DESCRIPTION: The focus will be on simulating the transport of fluid flow, heat, and mass during a materials process. Processes to be investigated include chemical and physical vapor deposition for composite processes, and crystal growth for electronic device application - both bulk and thin-film growth of gallium arsenide and indium phosphide. The goal is to incorporate innovative models and computational simulation techniques that account for transport phenomena effects and their influence on final material properties. In the composites area, new processes such as those enabling the use of functionally-graded materials will be addressed. Phase I involves developing transport phenomena models and algorithms that accurately simulate the three main processes described above, and validating the models and algorithms, if possible. Phase II will require the optimization of existing Air Force processing systems and the design and fabrication of new processing systems as guided by the simulation-modeling techniques. (Additional technical information packets for the topic may be obtained by calling Chris Hughes, 202-767-5015.)

DESCRIPTION: Future Air Force applications in airborne radar, electronic warfare, communications systems, nuclear-powered

space vehicles, satellite power conditioning, integrated engine electronics and "smart skins" in hypersonic vehicles will impose increasingly higher temperature conditions on their electronic components. The heat may be either inherent within the ambient environment, such as an engine, or generated by the power loads of the integrated circuits. Commercial applications can also be envisioned in aircraft and automotive applications. Current IC devices are limited in their response to approximately 125° C. To operate beyond this temperature necessitates the use of external cooling devices which impose a bulk and weight penalty that increases with increasing operating temperature at the cost of overall reliability. Research is currently underway to extend the temperature response capabilities of GaAs IC devices to 300-350° C with high signal speed, and SiC IC devices to 650-700° C with high power load. The objective of this program is to develop the electronic packaging and interconnect materials technology base to incorporate these IC's into advanced electronic devices, with emphasis on materials requirements for advanced multi-chip, multi-layer design concepts with corresponding operating temperature capability. Materials problems associated with continuous operation at high temperatures and temperature cycling must be addressed, including temperature effects on conductivity/dielectric properties; electrochemical, thermochemical, and thermomechanical stability; thermal conductivity; and interface chemistry and coefficient of thermal mismatch between dissimilar materials. For electronic systems with 300-350° C operational capability, the types of materials considered should include thin layer polymeric dielectrics for optimization of size and weight. For electronic systems with 650-700° C operational capability, thermooxidative constraints limit the dielectric materials to ceramics. Novel concept are sought for each temperature range, such as circuitry using conductive polymers related chemically to polymeric dielectric layers or circuitry using conductive ceramics similar in composition to ceramic dielectric layers. Innovative, potentially low-cost processing technology associated with the materials of choice is also encouraged. (Additional technical information packets for the topic may be obtained by calling Chris Hughes, 202-767-5015.)

AF 94T004 Title: Advanced Human-Computer Interfaces

DESCRIPTION: Advanced human-computer interfaces provide faster and more accurate human performance in such diverse contexts as intelligent tutoring, command and control, teleoperation, and scientific visualization. Novel solutions to problems associated with human interface are encouraged to increase the fidelity, bandwidth, and measured utility of systems that use technologies of virtual reality. Improved techniques are desired for conveying visual, auditory, tactile and kinesthetic sensory data to human operators. Novel means of detecting and processing data from human head, eye, limb and hand movements are also needed. Canonical representations of operator state are needed for interfacing with data representing closed loop (e.g. instructional material) or open loop (e.g. natural world environments). Novel techniques are needed to permit access by multiple operators to a single dynamic database. Examples of specific area include, but are not limited to: devices for holographic viewing, techniques for inducing high fidelity tactile perception, techniques for monitoring limb position while providing force feedback, techniques for adapting standard databases for use in virtual environments, techniques for maintaining stability of calibration to afford closed-loop fine motor control, techniques for assessing the value added of novel methods for displaying continuous (e.g. images) or symbolic data. (Additional technical information packets for the topic may be obtained by calling Chris Hughes, 202-767-5015.)

ADVANCED RESEARCH PROJECTS AGENCY

Submission of Proposals

The Office of Administration and Small Business is responsible for overseeing and implementing ARPA's Small Business Technology Transfer Program (STTR). The ARPA Coordinator who administers the program is Connie Jacobs. ARPA invites small businesses in cooperation with a researcher from a university, contractor-operated federally-funded research and development center, or nonprofit research institution to send proposals directly to ARPA at the following address:

ARPA/OASB/STTR
Attention: Ms. Connie Jacobs
3701 North Fairfax Drive
Arlington, VA 22203-1714
(703) 696-2448

The topics published in this solicitation are broad in scope. They were developed to bring the small business community and research partners together to meet the technological needs of today. ARPA has identified 7 technical topics, Numbered ARPA 94T-001 through ARPA 94T-007, to which small businesses may respond in the FY94 solicitation. Please note that these are the only topics for which proposals will be accepted at this time.

ARPA's charter is to help maintain U.S. technological superiority over, and to prevent technological surprise by, its potential adversaries. Thus, the ARPA goal is to pursue as many highly imaginative and innovative research ideas and concepts with potential dual-use applicability as the budget and other factors will allow. ARPA's budget for STTR during FY94 is \$1M. We expect to make awards of approximately \$100,000 each. Phase II proposals will be limited to \$250,000, however, additional funding may be available for optional tasks.

ARPA selects proposals for funding based upon technical merit, its potential for commercialization, and other evaluation criteria contained in this solicitation document. ARPA reserves the right to select and fund only those proposals considered to be superior in overall technical quality and highly relevant to the ARPA mission. As a result, ARPA may fund more than one proposal in a specific topic area if the technical quality of the proposals in question is deemed superior, or it may fund no proposals in a topic area. Each proposal submitted to ARPA must have a topic number and can only respond to one topic. However, a small business may submit several proposals to a single topic as long as each proposal is modified with a varied approach.

ARPA does not provide bridge funding between Phase I and Phase II awards. However, we are committed to providing the highest quality of service to small businesses in processing Phase II proposals as they are received at the Agency.

ARPA has prepared a checklist to assist small business activities in responding to ARPA topics. Please use this checklist prior to mailing or hand-carrying your proposal(s) to ARPA. Do not include the checklist with your proposal.

**ARPA 1994 Phase I STTR
Checklist**

1) Proposal Format

- a. Cover Sheet - Appendix A (identify topic number) _____
- b. Project Summary - Appendix B _____
- c. Identification and Significance of Problem or Opportunity _____
- d. Phase I Technical Objectives _____
- e. Phase I Work Plan _____
- f. Related Work _____
- g. Relationship with Future Research and/or Development _____
- h. Potential Post Applications _____
- i. Key Personnel _____
- j. Facilities/Equipment _____
- k. Consultants _____
- l. Prior, Current, or Pending Support _____
- m. Cost Proposal - Appendix C _____
- n. Company Commercialization Report _____
- o. Agreement between the Small Business and Research Institution _____

2) Bindings

- a. Staple proposals in upper left-hand corner. _____
- b. Do not use a cover. _____
- c. Do not use special bindings. _____

3) Page Limitation

- a. Total for each proposal is 25 pages inclusive of cost proposal (Appendix C) and resumes. _____
- b. Beyond the 25 page limit do not send appendices, attachments and/or additional references. _____

4) Submission Requirement for Each Proposal

- a. Original proposal, including signed **RED** Appendices A and B. _____
- b. Four photocopies of original proposal, including signed Appendices A and B. _____
- c. One additional photocopy of Appendices A and B only. _____

ARPA 94T001 TITLE: Low Cost Electronics Manufacturing

DESCRIPTION: ARPA/MTO is soliciting ideas for the low-cost manufacturing of electronic devices and systems. Areas of special interest include semiconductor process synthesis and low-cost thermal imaging systems.

ARPA seeks to develop a semiconductor process synthesis framework, including extended process models, manufacturing tool simulations, and software architectures. By coupling programmable process tools to a process synthesis design environment, reusable designs and production processes can be developed and optimized. The resulting framework will aid integrated circuit designers in the synthesis of new processes and optimization of existing processes for technology and product-specific applications. The goals are the reduction of manufacturing costs and cycle times and an increase in product reliability.

In the area of thermal imaging systems, specialized electronics, made possible through use of process synthesis tools, will be an integral part of a new concept in infrared system technology. Major system modules for lightweight optics, sensor packaging, and cooling technology (if applicable) will be integrated with specialized imaging system electronics for a low cost approach to thermal imaging systems. These modules will be developed with design tools which synthesize the system integration process, taking into account performance, cost, and the interfaces between modules.

REFERENCES:

Lemnios, Zachary J. "Flexible Intelligent Process Equipment," International Symposium on Semiconductor Manufacturing ISSM '93, Austin, TX September 20, 1993. A copy of this paper may be obtained by calling (703)696-2448.

Texas Instruments Technical Journal, September-October 1992.

ARPA 94T002 TITLE: High Energy Electron Beam Processing of Materials

DESCRIPTION: Recent advances of compact high energy electron accelerators open up many exciting opportunities for material processing which were not possible with conventional carbon dioxide lasers and low energy electron beam machines. These accelerators typically produce an electron beam with energy under 10 MeV, and depending on the class of accelerators, the beam current can vary from mA to kA. The electron beam power can vary from tens of kW to one MW. Independent of the current and the power, the unique property offered by these machines is the high energy electron beam capability to penetrate deeply into the materials being processed. Two examples of low power applications are bonding of composites and curing of thick composite structures. In these cases the electron beam initiates polymerization and crosslinking reactions without significant temperature rise in the samples. This results in much lower residual stresses in the materials and shorter curing times. Larger samples can also be accommodated by increasing the beam power and spreading the beam footprint. Examples of high power applications are shock hardening, heat treatment, welding of thick sections of steel, and manufacturing of composite engine parts. Other potential applications of high energy electron beams include toxic waste treatment and food preservation. This solicitation seeks proof-of-principle demonstrations of high energy electron beam processing of materials. An important factor in choosing the demonstration should be the eventual cost-effectiveness and the economic impact. While the major part of the funding will be used for proof-of-principle demonstrations of the various processes, a small percentage of the funding could be used for upgrading the existing accelerators, but the construction of new accelerators will not be supported.

REFERENCE:

"Proceeding on High Energy Electron Beam Welding and Materials Processing," Sep. 21-23, 1993, American Welding Society, 550 NW LeJeune Road, Miami, Florida, 33126.

ARPA 94T003 TITLE: Strategic Planning Tools Based on Object-Oriented Technology

DESCRIPTION: A strategic planning tool is desired to enable program managers for the ARPA information processing science and technology programs to create object-oriented models of program plans, investment strategies, and technology development roadmaps that can be displayed visually, edited graphically, and can serve as input to object-oriented models for risk and maturity analysis. The tools are envisioned to be used by a program manager to provide quantitative and qualitative analysis support for program planning (for example, to help determine technology gaps, assess risk, etc.) and to help other program managers desiring to apply the research results in other programs. For example, it is envisioned that a program manager will build an object-oriented decision analysis model that captures that program manager's rationale for investment decision, program milestones, etc., and allows others to inspect and perform a sensitivity analysis on that rationale. These tools should be fully

compatible with current Internet information services and easily interoperable with office automation systems. The tools will be demonstrated on a specific ARPA information processing program such as the Planning and Decision ATD (Advanced Technology Demonstration) Program through consultation with the ARPA program manager selected to manage this project. The tools are intended to exploit evolving ARPA information processing techniques and readily available off-the-shelf commercial hardware and software.

REFERENCES:

Cross, S. "An ARPA Strategic Plan for Intelligent Systems," viewgraphs used in keynote address at the 1993 National Conference on Artificial Intelligence. A copy of these viewgraphs may be obtained by calling (703)696-2448.

Krol, E. The Whole Internet: User's Guide and Catalog. O'Reilly and Associates, Inc., ISBN 1-56592-025-2.

Rouse, W. Strategies for Innovation. John Wiley & Sons, Inc., ISBN 0-471-55904-0.

Rumbaugh, J. Object-Oriented Modeling and Design. Prentice Hall, ISBN 0-13-629841-9.

ARPA 94T004 TITLE: Real Time Contextual Analysis of Multi-Sensor Scenes

DESCRIPTION: Develop real time advanced algorithms for the context-based fusion of multi-sensor scene information. Using a combination of physical models, mobility, expected target and vehicle signatures, knowledge of sensors and environments as constraints, investigate real time implementations which detect, recognize and identify targets, vehicles, and scene features through the use of single and multiple sensor inputs using literal (i.e., camera) and non-literal (i.e., radar) sensors. Special emphasis is placed on the use of non-linear models for clutter and target characterizations; statistical methods not requiring the assumption of an underlying gaussian distribution; representational techniques such as wavelets, image understanding techniques, neural and learning networks; fusion algorithms using Bayesian, Dempster-Shafer and Fuzzy Logic; and physics-based models for signature prediction. Algorithms should be scalable to real time operation on an existing computer architecture. They may be demonstrated in non-real time, provided it is clear that given a realizable configuration, a real time operation is achievable, i.e., scalable to real time given a 1.0-2.5 Giga Operations (GOPS), or massively parallel array, such as Paragon (nominally 200-300 nodes, and less than 128 Megabytes (Mbytes) of memory per node).

REFERENCES:

Image Understanding Workshops, Sep 1990 and April 1993. Dr. Oscar Firschein.

3rd International Conference on Industrial and Engineering Applications of Artificial Intelligence and Expert Systems, July 1990.

ARPA 94T005 TITLE: Distributed Micro/Mini Sensor Systems for Tactical Oceanography and Environmental Monitoring in Littoral Areas

DESCRIPTION: A wide range of Air, Strike, Special Operations, and Regional Warfare missions requires continuous, broad-area oceanographic and meteorological data collection and delivery. It is always difficult to collect sufficient environmental data near or inside a potential adversary's territorial zone, but this difficulty is exacerbated during the prelude to hostilities. It is impossible during hostilities. Weather sensing is suspended throughout the area and coastal oceanographic/hydrographic surveys cannot be accomplished. The current Naval Oceanographic Program is unable to supply the continuous, high-accuracy environmental data required to support amphibious operations and the use of precision guided munitions and tactical sensor systems. Advances in micromechanical and electronic systems may allow an entirely different approach to ocean surveillance and environmental monitoring. Oceanographic monitoring might be accomplished with the use of a large number of distributed, expendable micro-sensors. ARPA is interested in both sensor concept and development as well as systems engineering, communication concepts, deployment techniques, etc.

The proposed program will develop the technologies and applications, using overt and clandestine Microelectromechanical Systems (MEMS) sensor devices, to answer this critical need for environmental data collected temporally and spatially throughout the pre-hostility and hostility phases of conflict. Liquid Crystal Shutters (LCS) and photonic filters on silicon chips can range-gate laser radar systems, and are being considered as spatial light modulators to do optical information processing and micro-photospectroscopy. Also, liquid crystal-filled fiber optic sensors modulate a passing laser beam by changes in surrounding conductivity, and can possibly be used as microconductivity probes in conjunction with other inexpensive

miniature sensors. MEMS sensors will be developed to accurately measure a range of data, including: bathymetry, currents, tides, sea state, water temperature, visibility through the air and water, air temperature, humidity, refractive index, etc. The technological issues include: development of a MEMS micro-sensor for each data element and combining them, as possible, into single units; position sensing via an ocean surface micro-GPS (Global Positioning System) device; transmission, collection, and collation of data; cost reduction and manufacturing technology for expendable devices; deployment technologies; and power/endurance for the sensors. The emphasis in this program would be to use both micromechanical and microphotometric sensor technology.

REFERENCES:

Brendley, Keith W., and Randall Steeb, "Military Applications of Microelectromechanical Systems," National Defense Research Institute.

Widder, et al (1993), "Large Volume Bioluminescence Bathypotometer," *Deep-Sea Research* 40 (3):607-627

IEEE/ASME Journal of Microelectromechanical Systems

IEEE Microelectromechanical Workshop Technical Digests

IEEE Transducers '9x Digest of Microelectromechanical Systems

ARPA 94T006 TITLE: Remote Fiber Optic Links

DESCRIPTION: ARPA has maintained a strong effort in the development of fiber optic components and systems for applications to antennas, and is seeking designs which rely on the use of novel components and/or innovative architectures to achieve significant performance gains over current designs. The link designs should significantly advance the state of the art in systems for antenna remoting by providing net link gain, a very low noise figure (better than 4 dB), and extremely high spurious-free dynamic range (in excess of 120 dB/(Hz)^{-2/3}). Fiber optic links should be designed to support typical radar or communication systems applications. Attention should be given to the practical aspects of inserting the technology into a fielded system application including packaging, reliability issues, power consumption, and producibility. These fiber optic links will find numerous applications in military antennas, radar and communications systems, and in antenna ranges and radar cross section measurement chambers. In addition, civilian applications include electromagnetic field sensing, CATV, satellite TV ground stations, and FAA airfield sensing and warning systems.

REFERENCES:

Proceedings of the Third Annual DARPA Symposium on Photonic Systems for Antenna Applications, January 1993, (to be published summer 1993)

Yao and Hendrickson, eds. Proceedings of Optical Technology for Microwave Applications VI, *SPIE Proceedings*, Vol. 1703, April 1992.

Simons, R. Optical Control of Microwave Devices, Artech House, 1990.

ARPA 94T007 TITLE: Graphical Imaging of Waste or Contaminant Flow for Environmental Monitoring System Design

DESCRIPTION: The movement of contaminants, on waterways or underground, has drawn a considerable amount of interest. DoD and DOE have areas where waste has been buried or contaminants have been dumped on the ground. In some cases, these contaminants have reached ground water, moved between layers in the soil, or have made their way into streams and rivers. These source areas now require cleanup.

Before cleanup can begin, the area or site has to be characterized. The present means of characterizing a site requires drilling of wells and sampling for contaminants. Waterways are also sampled. The samples are then taken to laboratories for analysis. This process is quite costly.

In order to better estimate the location of wastes and contaminants and minimize drilling and sampling time, graphical imaging tools are needed. These tools would allow a site characterization team to better locate the contaminated areas, thus

focusing their activities. Additionally, the remediation teams would use this same tool to help focus their efforts.

Based on various geological and waterway data, the imaging tools should be able to depict both the contaminant source and movement. Movement of the contaminant through soil strata, underground aquifers, and waterways should be modeled and depicted on a personal computer or graphics workstation. Various contaminants should be depicted based on a user-selected color code. The graphical imaging tools should show the movement of contaminants over time.

Aside from DoD and DOE site cleanup, this same tool could have utility in locating signatures of nuclear, chemical, and biological weapons proliferation. Production of these weapons of mass destruction results in signatures which can be found in the atmosphere, waterways, or soil. If the proliferator attempts to hide production, contaminants (or signatures) may be released into the soil or waterways which surround the production area. As one example, news reports have indicated the existence of weapons production facilities underground. Proliferators operating underground facilities could attempt to hide production by dumping wastes into underground aquifers, into waterways, or on the soil.

BALLISTIC MISSILE DEFENSE ORGANIZATION (BMDO)
SMALL BUSINESS TECHNOLOGY TRANSFER PROGRAM
Submitting Proposals

Send **five** copies of Phase I proposals to:
(Appendix A and B need not be red)
For administrative help **ONLY**:
call **800-937-3150**

Ballistic Missile Defense Organization
7100 Defense Pentagon
ATTN: DTI/STTR
Washington, DC 20301-7100

Proposals delivered by means other than US Mail must be delivered to Room 1D110, The Pentagon, Washington, DC. **WARNING: Only persons with access to the interior of the Pentagon building can reach Room 1D110. Delivery to a Pentagon entrance is not sufficient.** BMDO will acknowledge receipt if the proposal includes a self-addressed stamped envelope.

BMDO seeks the most innovative technology to find and disable a missile in flight -lighter, faster, smarter, more reliable components. Proposers need not know details of possible BMDO systems.

BMDO seeks to invest seed-capital, to supplement private capital, in a product with a future market potential (preferably private sector) and a measurable BMDO benefit. BMDO will not compete with private or government markets in that it will not further develop concepts already mature enough to compete for private capital or government development funds. BMDO prefers projects which move technology from the non-profit institution into the private sector market through a market-oriented small firm. BMDO expects to fund about 20 projects.

Phase I should be only an examination of the feasibility and competitive merit of the concept with an average cost about \$60,000. Although proposed cost will not affect selection for negotiation, contracting may be delayed if BMDO reduces the cost ceiling. Phase I competition will give approximately equal weight to degree of innovation and market potential. Phase II competition will give more weight to future market potential. BMDO expects keen competition for both Phases.

Principal Investigators in the small firm may not be tenured faculty receiving compensation from a university.

Because BMDO seeks the best nation-wide experts in innovative technology, proposers may suggest both technical reviewers and contract technical monitors by enclosing a cover letter with the name, organization, address and phone number (if known), and a rationale for each suggestion. Each must be a government employee. BMDO promises only to consider the suggestion.

BMDO 94T001 TITLE: Sensors

DESCRIPTION: Sensors provide warning of attack, target identification, target discrimination from non-target objects, and determination of kill. New and innovative approaches are sought for sensors in the infrared, visible, and ultraviolet wavelengths for passive, active, and interactive sensors. Examples are: cryogenic cooling, superconducting focal plane elements, low power optical beam steering, passive focal plane imaging, interferometry for imaging, optics, diode pumped lasers, and optical materials.

BMDO 94T002 TITLE: Electronics and Photonics

DESCRIPTION: BMDO needs advances in processing capacity made possible by advances in electronics and opto- electronics. BMDO wants to advance integrated circuits, detectors, sensors, large scale integration, and radiation hardness. Advances are sought in band gap engineering, single crystal diamond, solid state lasers, optical detectors, electronics packaging, and any other related breakthrough technology.

BMDO 94T003 TITLE: Computing

DESCRIPTION: BMDO seeks advances in processing massive amounts of battle information for discriminating targets, controlling a defense, operating interceptors, and measuring results. Advances sought include computer architecture, very high level language, algorithms, neural networks, fault tolerance and other advances.

BMDO 94T004 TITLE: Surprises and Opportunities

DESCRIPTION: BMDO recognizes that, at the leading edge of technology, surprises and opportunities may arise from creative minds and entrepreneurs. BMDO will consider proposals in other technologies that present an extraordinary opportunity for BMDO. But proposals will receive a preliminary screening that may reject them without full technical review as not offering enough of an extraordinary opportunity. This open call is for breakthrough technology with great market potential beyond the standards for the topics listed above.

9.0 SUBMISSION FORMS AND CERTIFICATIONS

Section 9.0 contains:

Appendix A: Proposal Cover Sheet

An original red-printed Appendix A must be included with each proposal submitted.

Appendix B: Project Summary Form

An original red-printed Appendix B must be included with each proposal submitted. Don't include proprietary or classified information in the project summary form.

Appendix C: Cost Proposal Outline

A cost proposal following the format in Appendix C must be included with each proposal submitted.

Reference A: Model Agreement for the Allocation of Intellectual Property and Follow-on Rights

This is only a model provided as a guideline for the small business in the development of an agreement that allocates intellectual property rights and rights to follow-on research, development, or commercialization between the small business and the research institution (see Section 3.4.o for more details). The small business is not required to use this model agreement, in whole or part, for its agreement with the research institution. A written agreement between the small business and research institution need not be submitted with the proposal, but must be available upon request.

Reference B: Proposal Receipt Notification Form

Reference C: Directory of Small Business Specialists

Reference D: SF 298 Report Documentation Page

Reference E: DoD SBIR/STTR Mailing List Form

U.S. DEPARTMENT OF DEFENSE
SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PROGRAM
PROPOSAL COVER SHEET

Failure to use a RED Copy as the original for each proposal and to fill
in all appropriate spaces may cause your proposal to be disqualified

TOPIC NUMBER:	PROPOSAL TITLE:	
PRINCIPAL INVESTIGATOR:		PI TELEPHONE:
PROPOSED COST:	PHASE I OR II:	PROPOSED DURATION IN MONTHS:

FIRM			RESEARCH INSTITUTION		
NAME:			NAME:		
STREET:			STREET:		
CITY:	STATE:	ZIP:	CITY:	STATE:	ZIP:
CORPORATE OFFICIAL NAME:			INSTITUTE OFFICIAL NAME:		
TITLE:			TITLE:		
TELEPHONE:			TELEPHONE:		
PERCENTAGE OF WORK:			PERCENTAGE OF WORK:		

CERTIFICATION:

Is the FIRM a small business as described in section 2.3?	YES	NO
	☐	☐
Is the INSTITUTION a research institution as defined in section 2.4?	☐	☐
Is the FIRM a socially and economically disadvantaged business as defined in section 2.5?	☐	☐
Is the FIRM a woman-owned small business as described in section 2.6?	☐	☐
Number of employees in the FIRM including all affiliates:	-----	
Has this proposal has been submitted to other government agencies or DoD components?	☐	☐

If yes, list the names of the agency or component and topic number below:

For any purpose other than to evaluate the proposal, this data except Appendix A and B shall not be disclosed outside the Government and shall not be duplicated, used or disclosed in whole or in part, provided that if a contract is awarded to this proposer as a result of or in connection with the submission of this data, the Government shall have the right to duplicate, use or disclose the data to the extent provided in the funding agreement. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction.

SIGNATURE OF PRINCIPAL INVESTIGATOR	DATE	SIGNATURE OF CORPORATE OFFICIAL	DATE	SIGNATURE OF INSTITUTION OFFICIAL	DATE
-------------------------------------	------	---------------------------------	------	-----------------------------------	------

INSTRUCTIONS FOR COMPLETING APPENDIX A
AND APPENDIX B

General:

DOD Components employ automated optical devices to record STTR proposal information. Therefore the proposal cover sheet (Appendix A) and the project summary (Appendix B) should be typed without proportional spacing using one of the following typesstyles:

Courier 12,10 or 12 pitch
Courier 71 10 pitch
Elite 71
Letter Gothic 10 or 12 pitch
OCR-B 10 or 12 pitch
Pica 72 10 pitch
Prestige Elite 10 or 12 pitch
Prestige Pica 10 Pitch

Whenever a numerical value is requested type the numerical character (i.e. in "Proposed Duration" type 6 NOT six).

When typing address information use the two alphabet characters used by the Post Office for the state, DO NOT SPELL OUT THE FULL STATE NAME (i.e. type NY not New York or N.Y.).

Complete and SUBMIT THE ORIGINAL RED FORMS bound in this solicitation (not photocopies) as page 1 and 2 of the original copy of each proposal. The completed forms can then be copied for use as pages 1 and 2 of the photocopies of the proposal. The original proposal (with red forms) plus (4) complete copies must be submitted (see Section 6).

Carefully align the forms in the typewriter using the underlines as a guide. The forms are printed to accommodate standard typewriter spacing.

Additional red forms may be obtained from your State SBIR Organization (Reference C) or:

Defense Technical Information Center
ATTN: DTIC-User Services
Building 5, Cameron Station
Alexandria, VA 22304-6145
(800) 225-3842 (Toll Free)

U.S. DEPARTMENT OF DEFENSE
SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PROGRAM
PROPOSAL COVER SHEET

Failure to use a RED Copy as the original for each proposal and to fill
in all appropriate spaces may cause your proposal to be disqualified

TOPIC NUMBER:	PROPOSAL TITLE:	
PHASE I OR II PROPOSAL:	FIRM NAME:	PRINCIPAL INVESTIGATOR:
TECHNICAL ABSTRACT (Limit your abstract to 250 words with no classified or proprietary information/data)		
ANTICIPATED BENEFITS/POTENTIAL COMMERCIAL APPLICATIONS OF THE RESEARCH OR DEVELOPMENT		
KEYWORDS (List a maximum of 8 Keywords that describe the project)		

INSTRUCTIONS FOR COMPLETING APPENDIX A

AND APPENDIX B

General:

DOD Components employ automated optical devices to record STTR proposal information. Therefore the proposal cover sheet (Appendix A) and the project summary (Appendix B) should be typed without proportional spacing using one of the following typesstyles:

- Courier 12,10 or 12 pitch
- Courier 71 10 pitch
- Elite 71
- Letter Gothic 10 or 12 pitch
- OCR-B 10 or 12 pitch
- Pica 72 10 pitch
- Prestige Elite 10 or 12 pitch
- Prestige Pica 10 Pitch

Whenever a numerical value is requested type the numerical character (i.e. in "Proposed Duration" type 6 NOT six).

When typing address information use the two alphabet characters used by the Post Office for the state, DO NOT SPELL OUT THE FULL STATE NAME (i.e. type NY not New York or N.Y.).

Complete and SUBMIT THE ORIGINAL RED FORMS bound in this solicitation (not photocopies) as page 1 and 2 of the original copy of each proposal. The completed forms can then be copied for use as pages 1 and 2 of the photocopies of the proposal. The original proposal (with red forms) plus (4) complete copies must be submitted (see Section 6).

Carefully align the forms in the typewriter using the underlines as a guide. The forms are printed to accommodate standard typewriter spacing.

Additional red forms may be obtained from your State SBIR Organization (Reference C) or:

Defense Technical Information Center
ATTN: DTIC-User Services
Building 5, Cameron Station
Alexandria, VA 22304-6145
(800) 225-3842 (Toll Free)

**U.S. DEPARTMENT OF DEFENSE
SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PROGRAM
COST PROPOSAL**

Background:

The following items, as appropriate, should be included in proposals responsive to the DoD Solicitation Brochure.

Cost Breakdown Items (in this order, as appropriate):

1. Name of offeror
2. Home office address
3. Location where work will be performed
4. Title of proposed effort
5. Topic number and topic title from DoD Solicitation Brochure
6. Total dollar amount of the proposal
7. Direct material costs
 - a. Purchased parts (dollars)
 - b. Subcontracted items (dollars)
 - c. Other
 - (1) Raw material (dollars)
 - (2) Your standard commercial items (dollars)
 - (3) Interdivisional transfers (at other than cost dollars)
 - d. Total direct material (dollars)
8. Material overhead (rate _____ %) x total direct material = dollars
9. Direct labor (specify)
 - a. Type of labor, estimated hours, rate per hour and dollar cost for each type
 - b. Total estimated direct labor (dollars)
10. Labor overhead
 - a. Identify overhead rate, the hour base and dollar cost
 - b. Total estimated labor overhead (dollars)
11. Special testing (include field work at government installations)
 - a. Provide dollar cost for each item of special testing
 - b. Estimated total special testing (dollars)
12. Special equipment
 - a. If direct charge, specify each item and cost of each
 - b. Estimated total special equipment (dollars)
13. Travel (if direct charge)
 - a. Transportation (detailed breakdown and dollars)
 - b. Per diem or subsistence (details and dollars)
 - c. Estimated total travel (dollars)
14. Consultants
 - a. Identify each, with purpose, and dollar rates
 - b. Total estimated consultants costs (dollars)
15. Other direct costs (specify)
 - a. Total estimated direct cost and overhead (dollars)
16. General and administrative expense
 - a. Percentage rate applied
 - b. Total estimated cost of G&A expense (dollars)
17. Royalties (specify)
 - a. Estimated cost (dollars)
18. Fee or profit (dollars)
19. Total estimate cost and fee or profit (dollars)
20. The cost breakdown portion of a proposal must be signed by a responsible official, and the person signing must have typed name and title and date of signature must be indicated.
21. On the following items offeror must provide a yes or no answer to each question.
 - a. Has any executive agency of the United State Government performed any review of your accounts or records in connection with any other government prime contract or subcontract within the past twelve months? If yes, provide the name and address of the reviewing office, name of the individual and telephone extension.
 - b. Will you require the use of any government property in the performance of this proposal? If yes, identify.
 - c. Do you require government contract financing to perform this proposed contract? If yes, then specify type as advanced payments or progress payments.
22. Type of contract proposed, either cost-plus-fixed-fee or firm-fixed price.

SMALL BUSINESS TECHNOLOGY TRANSFER (STTR) PROGRAM

**ALLOCATION OF RIGHTS IN INTELLECTUAL PROPERTY AND
RIGHTS TO CARRY OUT FOLLOW-ON RESEARCH, DEVELOPMENT,
OR COMMERCIALIZATION**

(This is only a model)

This Agreement between _____, a small business concern organized as a _____ under the laws of _____ and having a principal place of business at _____, ("SBC") and _____, a research institution having a principal place of business at _____, ("RI") is entered into for the purpose of allocating between the parties certain rights relating to an STTR project to be carried out by SBC and RI (hereinafter referred to as the "PARTIES") under an STTR funding agreement that may be awarded by _____ ("AGENCY") to SBC to fund a proposal entitled "_____ submitted, or to be submitted, to AGENCY by SBC on or about _____, 199_.

1. Applicability of this Agreement.

- (a) This Agreement shall be applicable only to matters relating to the STTR project referred to in the preamble above.
- (b) If a funding agreement for an STTR project is awarded to SBC based upon the STTR proposal referred to in the preamble above, SBC will promptly provide a copy of such funding agreement to RI, and SBC will make a subaward to RI in accordance with the funding agreement, the proposal, and this Agreement. If the terms of such funding agreement appear to be inconsistent with the provisions of this Agreement, the PARTIES will attempt in good faith to resolve any such inconsistencies. However, if such resolution is not achieved within a reasonable period, SBC shall not be obligated to award nor RI to accept the subaward. If a subaward is made by SBC and accepted by RI, this Agreement shall not be applicable to contradict the terms of such subaward or of the funding agreement awarded by AGENCY to SBC except on the grounds of fraud, misrepresentation, or mistake, but shall be considered to resolve ambiguities in the terms of the subaward.
- (c) The provisions of this Agreement shall apply to any and all consultants, subcontractors, independent contractors, or other individuals employed by SBC or RI for the purposes of this STTR project.

2. Background Intellectual Property.

(a) "Background Intellectual Property" means property and the legal right therein of either or both parties developed before or independent of this Agreement including inventions, patent applications, patents, copyrights, trademarks, mask works, trade secrets and any information embodying proprietary data such as technical data and computer software.

(b) This Agreement shall not be construed as implying that either party hereto shall have the right to use Background Intellectual Property of the other in connection with this STTR project except as otherwise provided hereunder.

(1) The following Background Intellectual Property of SBC may be used nonexclusively and, except as noted, without compensation by RI in connection with research or development activities for this STTR project (if "none" so state): _____;

(2) The following Background Intellectual Property of RI may be used nonexclusively and, except as noted, without compensation by SBC in connection with research or development activities for this STTR project (if "none" so state): _____;

(3) The following Background Intellectual Property of RI may be used by SBC nonexclusively in connection with commercialization of the results of this STTR project, to the extent that such use is reasonably necessary for practical, efficient and competitive commercialization of such results but not for commercialization independent of the commercialization of such results, subject to any rights of the Government therein and upon the condition that SBC pay to

RI, in addition to any other royalty including any royalty specified in the following list, a royalty of ___% of net sales or leases made by or under the authority of SBC of any product or service that embodies, or the manufacture or normal use of which entails the use of, all or any part of such Background Intellectual Property (if "none" so state): _____

3. Project Intellectual Property.

(a) "Project Intellectual Property" means the legal rights relating to inventions (including Subject Inventions as defined in 37 CFR § 401), patent applications, patents, copyrights, trademarks, mask works, trade secrets and any other legally protectable information, including computer software, first made or generated during the performance of this STTR Agreement.

(b) Except as otherwise provided herein, ownership of Project Intellectual Property shall vest in the party whose personnel conceived the subject matter or first actually reduced the subject matter to practice, and such party may perfect legal protection therein in its own name and at its own expense. Jointly made or generated Project Intellectual Property shall be jointly owned by the PARTIES unless otherwise agreed in writing. The SBC shall have the first option to perfect the rights in jointly made or generated Project Intellectual Property unless otherwise agreed in writing.

(1) The ownership, including rights to any revenues and profits, resulting from any product, process, or other innovation or invention based on the cooperative shall be allocated between the SBC and the RI as follows:

SBC Percent: _____ RI Percent: _____

(2) Expenses and other liabilities associated with the development and marketing of any product, process, or other innovation or invention shall be allocated as follows:

SBC Percent: _____ RI Percent: _____

(c) The PARTIES agree to disclose to each other, in writing, each and every Subject Invention, which may be patentable or otherwise protectable under the United States patent laws in Title 35, United States Code. The PARTIES acknowledge that they will disclose Subject Inventions to each other and the awarding agency within ___ months after their respective inventor(s) first disclose the invention in writing to the person(s) responsible for patent matters of the disclosing Party. All written disclosures of such inventions shall contain sufficient detail of the invention, identification of any statutory bars, and shall be marked confidential, in accordance with 35 U.S.C. § 205.

(d) Each party hereto may use Project Intellectual Property of the other nonexclusively and without compensation in connection with research or development activities for this STTR project, including inclusion in STTR project reports to the AGENCY and proposals to the AGENCY for continued funding of this STTR project through additional phases.

(e) In addition to the Government's rights under the Patent Rights clause of 37 CFR § 401.14, the PARTIES agree that the Government shall have an irrevocable, royalty free, nonexclusive license for any governmental purpose in any Project Intellectual Property.

(f) SBC will have an option to commercialize the Project Intellectual Property of RI, subject to any rights of the Government therein, as follows--

(1) Where Project Intellectual Property of RI is a potentially patentable invention, SBC will have an exclusive option for a license to such invention, for an initial option period of ___ months after such invention has been reported to SBC. SBC may, at its election and subject to the patent expense reimbursement provisions of this section, extend such option for an additional ___ months by giving written notice of such election to RI prior to the expiration of the initial option period. During the period of such option following notice by SBC of election to extend, RI will pursue and maintain any patent protection for the invention requested in writing by SBC and, except with the written consent of SBC or upon the failure of SBC to reimburse patenting expenses as required under this section, will not voluntarily discontinue the pursuit and maintenance of any United States patent protection for the invention initiated by RI or of any patent protection requested by SBC. For any invention for which SBC gives notice of its election to extend the option, SBC will, within ___ days after invoice, reimburse RI for the expenses incurred by RI prior to expiration or termination of the option period in pursuing and maintaining (i) any United States patent protection initiated by RI and (ii) any patent protection requested by SBC. SBC may terminate such option at will by giving written notice to RI, in which case further accrual of reimbursable patenting expenses hereunder, other than prior commitments not practically revocable, will cease upon RI's receipt of such notice.

At any time prior to the expiration or termination of an option, SBC may exercise such option by giving written notice to RI, whereupon the parties will promptly and in good faith enter into negotiations for a license under RI's patent rights in the invention for SBC to make, use and/or sell products and/or services that embody, or the development, manufacture and/or use of which involves employment of, the invention. The terms of such license will include: (i) payment of reasonable royalties to RI on sales of products or services which embody, or the development, manufacture or use of which involves employment of, the invention; (ii) reimbursement by SBC of expenses incurred by RI in seeking and maintaining patent protection for the invention in countries covered by the license (which reimbursement, as well as any such patent expenses incurred directly by SBC with RI's authorization, insofar as deriving from RI's interest in such invention, may be offset in full against up to _____ of accrued royalties in excess of any minimum royalties due RI); and, in the case of an exclusive license, (iii) reasonable commercialization milestones and/or minimum royalties.

(2) Where Project Intellectual Property of RI is other than a potentially patentable invention, SBC will have an exclusive option for a license, for an option period extending until _____ months following completion of RI's performance of that phase of this STTR project in which such Project Intellectual Property of RI was developed by RI. SBC may exercise such option by giving written notice to RI, whereupon the parties will promptly and in good faith enter into negotiations for a license under RI's interest in the subject matter for SBC to make, use and/or sell products or services which embody, or the development, manufacture and/or use of which involve employment of, such Project Intellectual Property of RI. The terms of such license will include: (i) payment of reasonable royalties to RI on sales of products or services that embody, or the development, manufacture or use of which involves employment of, the Project Intellectual Property of RI and, in the case of an exclusive license, (ii) reasonable commercialization milestones and/or minimum royalties.

(3) Where more than one royalty might otherwise be due in respect of any unit of product or service under a license pursuant to this Agreement, the parties shall in good faith negotiate to ameliorate any effect thereof that would threaten the commercial viability of the affected products or services by providing in such license(s) for a reasonable discount or cap on total royalties due in respect of any such unit.

4. Follow-on Research or Development.

All follow-on work, including any licenses, contracts, subcontracts, sublicenses or arrangements of any type, shall contain appropriate provisions to implement the Project Intellectual Property rights provisions of this agreement and insure that the PARTIES and the Government obtain and retain such rights granted herein in all future resulting research, development, or commercialization work.

5. Confidentiality/Publication.

(a) Background Intellectual Property and Project Intellectual Property of a party, as well as other proprietary or confidential information of a party, disclosed by that party to the other in connection with this STTR project shall be received and held in confidence by the receiving party and, except with the consent of the disclosing party or as permitted under this Agreement, neither used by the receiving party nor disclosed by the receiving party to others, provided that the receiving party has notice that such information is regarded by the disclosing party as proprietary or confidential. However, these confidentiality obligations shall not apply to use or disclosure by the receiving party after such information is or becomes known to the public without breach of this provision or is or becomes known to the receiving party from a source reasonably believed to be independent of the disclosing party or is developed by or for the receiving party independently of its disclosure by the disclosing party.

(b) Subject to the terms of paragraph (a) above, either party may publish its results from this STTR project. However, the publishing party will give a right of refusal to the other party with respect to a proposed publication, as well as a _____ day period in which to review proposed publications and submit comments, which will be given full consideration before publication. Furthermore, upon request of the reviewing party, publication will be deferred for up to _____ additional days for preparation and filing of a patent application which the reviewing party has the right to file or to have filed at its request by the publishing party.

6. Liability.

(a) Each party disclaims all warranties running to the other or through the other to third parties, whether express or implied, including without limitation warranties of merchantability, fitness for a particular purpose, and freedom from infringement, as

to any information, result, design, prototype, product or process deriving directly or indirectly and in whole or part from such party in connection with this STTR project.

(b) SBC will indemnify and hold harmless RI with regard to any claims arising in connection with commercialization of the results of this STTR project by or under the authority of SBC. The PARTIES will indemnify and hold harmless the Government with regard to any claims arising in connection with commercialization of the results of this STTR project.

7. Termination.

(a) This agreement may be terminated by either Party upon ___ days written notice to the other Party. This agreement may also be terminated by either Party in the event of the failure of the other Party to comply with the terms of this agreement.

(b) In the event of termination by either Party, each Party shall be responsible for its share of the costs incurred through the effective date of termination, as well as its share of the costs incurred after the effective date of termination, and which are related to the termination. The confidentiality, use, and/or non-disclosure obligations of this agreement shall survive any termination of this agreement.

AGREED TO AND ACCEPTED--

Small Business Concern

By: _____ Date: _____

Print name: _____

Title: _____

Research Institution

By: _____ Date: _____

Print name: _____

Title: _____

RECEIPT NOTIFICATION

Reference B

TO: _____
(Fill in firm name)

(street)

(city, state ZIP)

SUBJECT: STTR Solicitation No. 94
Topic No. _____
(Fill in Topic No.)

This is to notify you that your proposal in response to the subject solicitation and topic number has been received by

(Fill in name of organization to which you will send your proposal)

Signature by receiving organization

Date

REF B

DIRECTORY OF SMALL BUSINESS SPECIALISTS

Associate Directors of Small Business assigned at Defense Contract Management Districts (DCMD) and Defense Contract Management Area Operations (DCMAO):

DCMD SOUTH

ATTN: Howard Head, Jr.
805 Walker Street
Marietta, GA 30060-2789
(800) 551-7801 (Toll Free-GA)
(800) 331-6415 (Nationwide)
(404) 590-6196
(404) 590-2612 (FAX)

DCMAO Atlanta

ATTN: Evelyn Taylor
805 Walker Street
Marietta, GA 30060-2789
(404) 590-6197

DCMAO Birmingham

ATTN: Lola Alexander
2121 Eight Avenue, N., Suite 104
Birmingham, AL 35203-2376
(205) 226-4304

DCMAO Dallas

ATTN: Jerome Anderson
1200 Main Street, Room 640
PO Box 50500
Dallas, TX 75202-4399
(214) 670-9205

DCMAO Orlando

ATTN: Russell Nielson
3555 Maguire Boulevard
Orlando, FL 32803-3726
(407) 228-5113/5260

DCMAO San Antonio

ATTN: Thomas Bauml
615 E. Houston Street, PO Box 1040
San Antonio, TX 78294-1040
(512) 229-4650

DCDM INTERNATIONAL

DCMAO Puerto Rico
ATTN: Victor Irizarry
209 Chapel Drive
Navy Security Group Activity
Sabana Seca, PR 00952
(809) 795-3202

DCMD NORTHEAST

ATTN: John McDonough
495 Summer Street, 8th Floor
Boston, MA 02210-2184
(800) 348-1011 (Toll Free MA Only)
(800) 321-1861 (Toll Free Outside MA)
(617) 451-4317/4318
(617) 451-3174 (FAX)

DCMAO Boston

ATTN: Gerald Hyde
495 Summer Street
Boston, MA 02210-2184
(617) 451-4108/4109/4110

DCMAO Bridgeport

ATTN: Otis Wade
555 Lordship Boulevard
Stratford, CT 06497-7124
(203) 385-4412

DCMAO Garden City

ATTN: John Richards
605 Stewart Avenue
Garden City, NY 11530-4761
(516) 228-5724

DCMAO Hartford

ATTN: Frank Prater
130 Darlin Street
E. Hartford, CT 06108-3234
(203) 291-7706/7705

DCMAO New York

ATTN: John Castellane
201 Varick Street, Room 1061
New York, NY 10014-4811
(212) 807-3050/3052

DCMAO Syracuse

ATTN: Ralph Vinciguerra
615 Erie Boulevard, West
Syracuse, NY 13204-2408
(315) 423-5664

DCMD WEST

ATTN: Renee Deavens
222 N. Sepulveda Blvd.
El Segundo, CA 90245-4394
(800) 233-6521 (Toll Free CA Only)
(800) 624-7372 (Toll Free-AK,HI,ID,MT,NV,OR,WA)
(310) 335-3260
(310) 335-4443 (FAX)

DCMAO San Francisco

ATTN: Robert Lane
1265 Borregas Ave.
Sunnyvale, CA 94089
(408) 541-7041

DCMAO San Diego

ATTN: Marvie Bowlin
7675 Dagget Street, Suite 200
San Diego, CA 92111-2241
(619) 495-7459/7467

DCMAO El Segundo

ATTN: Debbie Tatum
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