

THE FOLLOWING SOLICITATION IS

CLOSED

**DO NOT SUBMIT A PROPOSAL IN RESPONSE TO THIS
SOLICITATION**

USE FOR INFORMATION PURPOSES ONLY

**THE HOMELAND SECURITY ADVANCED RESEARCH PROJECTS AGENCY
(HSARPA)
SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM
PROGRAM SOLICITATION FY04.1**

HSARPA SBIR WILL NOT ACCEPT CLASSIFIED PROPOSALS

Closing Date: 15 December 2003, 4:00pm ET

Important Dates:

- **29 October 2003:** Pre-solicitation issued
- **14 November 2003:** Full-solicitation issued
- **19 November 2003:** HSARPA SBIR website opens
- **19 November 2003-15 December 2003:** Full-proposals accepted
- **15 December 2003:** Deadline for receipt of proposals at **4 p.m. ET**

IMPORTANT

Deadline for Receipt: Proposals must be completely submitted by **4:00 p.m. ET, 15 December 2003.**

No Printed Solicitation Books. Solicitations are available only in electronic format from the FebBizOpps website, in accordance with the Government Paperwork Elimination Act (GPEA).

Information. If you have questions about the HSARPA SBIR program, please submit your questions via the website at <http://www.hsarpasbir.com>

NOTICE: For administrative purposes only, submissions to this solicitation will be handled by an HSARPA Support Contractor.

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CLOSED

HSARPA SOLICITATION FOR SMALL BUSINESS INNOVATION RESEARCH

1.0 PROGRAM DESCRIPTION

Introduction

The Homeland Security Advanced Research Projects Agency, hereafter referred to as HSARPA, invites small business firms to submit proposals under this solicitation for the Small Business Innovation Research (SBIR) Program. Firms with the capability to conduct research and development (R&D) in any of the topic areas described in Section 8.0, and to commercialize the results of that R&D, are encouraged to participate.

Objectives of the HSARPA SBIR Program include stimulating technological innovation, strengthening the role of small business in meeting research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of R&D supported research or R&D results.

The Federal SBIR Program is mandated by the Small Business Innovation Development Act of 1982 (PL 97-219, as amended by PL 106-554). The basic design of the HSARPA SBIR program is in accordance with the Small Business Administration (SBA) SBIR Policy Directive, 2002. The SBIR program presented in this solicitation encourages scientific and technical innovation in areas specifically identified by HSARPA. 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 likely to yield results important to the homeland security and the private sector.

Three Phase Program

This program solicitation is issued pursuant to the Small Business Innovation Development Act of 1982 (PL 97-219, as amended by PL 106-554). Phase I is to determine, insofar as possible, the scientific, technical, and commercial merit and feasibility of ideas submitted under the SBIR Program. Phase I awards typically do not exceed \$100,000 in cost or extend beyond a six months period of performance. Proposals should concentrate on that research or research and development which will significantly contribute to proving the scientific, technical, and commercial feasibility of the proposed effort, the successful completion of which is a prerequisite for further HSARPA support in Phase II. The measure of Phase I success includes evaluations of the extent to which Phase II results would have the potential to yield a product or process of continuing importance to DHS and the private sector. Proposers are encouraged to consider whether the research or research and development they are proposing to HSARPA also has private sector potential, either for the proposed application or as a base for other applications.

Subsequent Phase II awards will be made to firms on the basis of results of their Phase I effort and the scientific, technical, and commercial merit of the Phase II proposal. Phase II awards are typically \$750,000 in cost and do not exceed 24 months period of performance. Phase II is the principal research or research and development effort and is expected to produce a well-defined deliverable prototype. A more comprehensive proposal will be required for Phase II.

Under Phase III, the small business is expected to obtain funding from the private sector and/or non-SBIR Government sources to develop the prototype into a viable product or non-R&D service for sale in Government and/or private sector markets.

This solicitation is for Phase I proposals only. Only proposals submitted in response to this solicitation will be considered for Phase I award. Only proposals submitted in response to topics contained in this solicitation will be accepted. Proposers who were not awarded a contract in response to a prior SBIR solicitation are free to update or modify and re-submit the same or modified proposal if it is responsive to any of the topics listed in Section 8.0.

For Phase II, no separate solicitation will be issued and no unsolicited proposals will be accepted. Only those firms that were awarded Phase I contracts are eligible to participate in Phases II and III.

HSARPA is not obligated to make any awards under either Phase I, II, or III, and all awards are subject to the availability of funds. HSARPA is not responsible for any monies expended by the proposer before award of any contract.

Proposer Eligibility and Limitations

Each proposer must qualify as a small business for research or research and development purposes as defined in Section 2.0 and certify to this on the Cover Sheet of the proposal. In addition, a minimum of two-thirds of the research and/or analytical work in Phase I must be carried out by the proposing firm. For Phase II, a minimum of one-half of the research and/or analytical work must be performed by the proposing firm. The percent of work is usually measured by both direct and indirect costs. For both Phase I and II, the primary employment of the principal investigator must be with the small business firm at the time of the award and during the conduct of the proposed effort. Primary employment means that more than one-half of the principal investigator's time is spent with the small business. Primary employment with a small business concern precludes full-time employment at another organization. For both Phase I and Phase II, all research or research and development work must be performed by the small business concern and its subcontractors in the United States.

Joint ventures and limited partnerships are permitted, provided that the entity created qualifies as a small business in accordance with the Small Business Act, 15 USC 631, and the definition included in Section 2.2.

Research and Analytical Work

- a. For Phase I,** a minimum of two-thirds of the research and/or analytical work must be performed by the proposing firm unless otherwise approved in writing by the contracting officer.
- b. For Phase II,** a minimum of one-half of the research and/or analytical work must be performed by the proposing firm, unless otherwise approved in writing by the contracting officer. The percentage of work is usually measured by both direct and indirect costs, although proposers planning to subcontract a significant fraction of their work should verify how it will be measured with their contracting officer during contract negotiations.

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 federal law. Such proposers

should contact the cognizant Ethics Counselor from the employee's Government agency for further guidance.

Questions About SBIR and Solicitation Topics

General SBIR questions/information.

- a. **Help Desk.** All questions about this solicitation, the proposal preparation and electronic submission should be submitted via the website: <http://www.hsarpasbir.com>. This website will open on 19 November 2003. Or, call the Help Desk toll free number: 1-800-754-3043.
- b. **HSARPA SBIR website** <http://www.hsarpasbir.com> offers electronic access to the SBIR solicitation, submission of frequently asked questions (FAQs), answers to FAQs, and hyperlinks to other useful information.
- c. **Electronic submission.** All Phase I proposals must be submitted via the electronic submission website at <http://www.hsarpasbir.com>.

2.0 DEFINITIONS

The following definitions apply for the purposes of this solicitation:

Research or Research and Development

Any activity that is:

- a. **Basic Research.** Scientific study and experimentation to provide fundamental knowledge required for the solution of problems.
- b. **Exploratory Development.** A study, investigation or minor development effort directed toward specific problem areas with a view toward developing and evaluating the feasibility and practicability of proposed solutions.
- c. **Advanced Development.** Proof of design efforts directed toward projects that have moved into the development of hardware for test.
- d. **Engineering Development.** Full-scale engineering development projects for Department of Homeland Security (DHS) or first responder use but which have not yet received approval for production.

Small Business

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

- a. Organized for profit, with a place of business located in the United States, which operates primarily within the United States or which makes a significant contribution to the United States economy through payment of taxes or use of American products, materials, or labor;
- b. In the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the form is a joint venture, there can be no more than 49 percent participation by foreign business entities in the joint venture;
- c. At least 51 percent owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States, except in the case of a joint venture, where

each entity to the venture must be 51 percent owned and controlled by one or more individuals who are citizens of, or permanent resident aliens in, the United States; and

- d. Not more than 500 employees, including its affiliates.

Socially and Economically Disadvantaged Small Business

A small business that is at the time of award of a Phase I or Phase II contract, at least 51 percent owned by one or more socially and economically disadvantaged individuals, as defined in 13 CFR Part 124 - 8(A) Business Development/Small Disadvantaged Business Status Determinations, §124.103 ("Who is socially disadvantaged?") and §124.104 ("Who is economically disadvantaged?").

Women-Owned Small Business

A women-owned small business is one that is at least 51 percent owned by one or more women, or in the case of a publicly owned business, at least 51 percent of the stock of which is owned by women, and 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 of the business.

Funding Agreement

Any contract or grant 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.

Subcontract

A subcontract is any agreement, other than one involving an employer-employee relationship, entered into by an awardee of a funding agreement calling for supplies or services for the performance of the original funding agreement. This includes consultants. See Section 3.5.b(9).

Commercialization

The process of developing marketable products or services and delivering products or services for sale (whether by the originating party or by others) to Government or commercial markets.

Essentially Equivalent Work

This occurs when (1) substantially the same research is proposed for funding in more than one contract proposal or grant application submitted to the same Federal agency; (2) substantially the same research is submitted to two or more different Federal agencies for review and funding consideration; or (3) a specific research objective and the research design for accomplishing an objective are the same or closely related in two or more proposals or awards, regardless of the funding source.

Historically Underutilized Business Zone (HUBZone) Small Business Concern

HUBZone small business concern means a small business concern that appears on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration. See www.sba.gov/hubzone for more details.

Service-Disabled Veteran

A veteran with a disability that is service connected as defined in Section 101 (16) of Title 38, United States Code.

Small Business Concern Owned and Controlled by Service-Disabled Veterans

A small business concern that:

- a. not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and
- b. the management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such a veteran.

Small Business Concern Owned and Controlled by Veterans

A small business concern that:

- a. not less than 51 percent of which is owned by one or more veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more; and
- b. the management and daily business operations of which are controlled by one or more veterans.

United States

"United States" means the fifty states, the territories and possessions of the Federal Government, the Commonwealth of Puerto Rico, the Republic of the Marshall Islands, the Federated States of Micronesia, the Republic of Palau, and the District of Columbia.

SBIR Technical Data

All data generated during the performance of an SBIR award.

SBIR Technical Data Rights

The rights a small business concern obtains in data generated during the performance of any SBIR Phase I, Phase II, or Phase III award that an awardee delivers to the Government during or upon completion of a federally funded project, and to which the Government receives a license.

3.0 PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

Proposal Requirements

A proposal to any Topic under the HSARPA SBIR Program is to provide sufficient information to persuade HSARPA 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 or technical content of the proposal will be the principal basis upon which proposals will be evaluated. The proposed research or research and development must be responsive to the chosen topic, although need not use the exact approach specified in the topic (see Section 4.1). Any small business contemplating a proposal 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 has the capability to implement the technical approach, i.e., has or can obtain people and equipment suitable to the task.

Proposal Checklist

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

- a. Read and follow all instructions contained in this solicitation.
- b. Submit your proposal electronically via website (<http://www.hsarpasbir.com>) and prepare your proposal as instructed on the website. A complete proposal consists of the proposal cover sheets, technical proposal and cost proposal.
- c. The proposal cost adheres to the topic criteria specified and the cost on the cover sheets matches the cost on the cost proposal.
- d. The Project Summary on the cover sheet contains NO proprietary information. Mark proprietary information within the technical proposal as instructed in Section 5.4.
- e. The content in the technical proposal, including the option (if applicable), includes the items in Section 3.5(b).
- f. The header on each page of your technical proposal should contain your company name, topic number, and proposal number. (The header may be included in the one-inch margins.)
- g. Limit your proposal to 25 pages.
- h. Use a type size no smaller than a 12-point font on standard 8 1/2 " X 11" paper with one (1) inch margins
- i. The technical proposal shall not be in 2-column format.

Note: Public access to the internet is available at most public libraries, local schools or a Small Business Development Center (SBDC) in your area.

Proprietary Information

If information is provided that constitutes a trade secret, proprietary commercial or financial information, or personal information or data, it will be treated in confidence to the extent permitted by law, provided it is clearly marked in accordance with Section 5.4. The cost proposal information will be treated as proprietary whether or not it is indicated.

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, including proposal cover sheet and cost proposal. Promotional and non-project related discussion is discouraged. The space allocated to each will depend on the problem chosen and the principal investigator's approach. In the interest of equity, pages in excess of the 25-page limitation (including attachments, appendices, or references) will not be considered for review or award.

Phase I Proposal Format

a. Proposal Cover Sheets. Prepare the proposal cover sheets (as provided on the electronic submission website <http://www.hsarpasbir.com>), including a brief technical abstract of the proposed R&D project and a discussion of anticipated benefits and potential commercial applications. Once you save the cover sheet, the system will assign a proposal number. You may edit the cover sheet as often as necessary until the solicitation closes. Your cover sheets will count as the first two pages of your proposal no matter how they print out. If your proposal is selected for award, the technical abstract and discussion of anticipated benefits will be publicly released on the Internet; therefore, do not include proprietary information in these sections. **CLASSIFIED PROPOSALS WILL NOT BE ACCEPTED.**

b. Technical Proposal. Create a single file that covers the following items in the order given below. Begin your technical proposal on Page 3 (since the cover sheets are pages 1 and 2) and put your firm name, topic number, and proposal number in the header of each page. (The header may be included in the one-inch margins.) The technical proposal file must be in Portable Document Format (PDF) for evaluation purposes. You cannot upload the technical proposal to the HSARPA submission website until you have created a cover sheet and been assigned a proposal number. Perform a virus check before uploading the technical proposal file. If a virus is detected, it may cause rejection of the proposal. The technical proposal should be a single file, including graphics and attachments (and cost proposal if not using the website's on-line cost proposal form). **Do not lock or encrypt the file you upload.**

- (1) **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.)
- (2) **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.
- (3) **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. The 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.
- (4) **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: (a) short description, (b) client for which work was performed (including individual to be contacted and phone number), and (c) date of completion.

- (5) **Relationship with Future Research or Research and Development.** (a) State the anticipated results of the proposed approach if the project is successful. (b) Discuss the significance of the Phase I effort in providing a foundation for Phase II research or research and development effort.
- (6) **Commercialization Strategy.** Describe in approximately one page your company's strategy for commercializing this technology in the DHS, other Federal Agencies, and/or private sector markets. Provide specific information on the market need the technology will address and the size of the market. Also, include a schedule showing the quantitative commercialization results from this SBIR project that your company expects to achieve and when (i.e., amount of additional investment, sales revenue, etc.).
- (7) **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. All resumes will count toward the 25-page limitation. Identify any foreign nationals you expect to be involved on this project, their country of origin and level of involvement.
- (8) **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 the cost proposal) 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.
- (9) **Subcontractors/Consultants.** Involvement of a university or other subcontractors or consultants in the project may be appropriate. (see Section 2.6) If such involvement is intended, it should be described in detail and identified in the cost proposal. A minimum of two-thirds of the research and/or analytical work in Phase I, as measured by direct and indirect costs, must be carried out by the proposing firm, unless otherwise approved in writing by the contracting officer. No portion of a SBIR award may be subcontracted back to any Federal Government Agency or Federally Funded Research and Development Centers (FFRDCs). SBA may issue a case-by-case waiver to this provision after review of the written justification that includes the following information: (a) an explanation of why the SBIR research project requires the use of the Federal/FFRDC facility or personnel, including data that verifies the absence of non-federal facilities or personnel capable of supporting the research effort; (b) why the Agency will not and cannot fund the use of the Federal/FFRDC facility or personnel for the SBIR project with non-SBIR money; and (c) the concurrence of the small business concern's chief business official to use the Federal/FFRDC facility or personnel. Award is contingent on the sponsoring agency obtaining a waiver.

(10) **Prior, Current, or Pending Support of Similar Proposals or Awards.** *Warning* -- While it is permissible, with proposal notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work (see Section 2.8) for consideration under numerous Federal program solicitations, it is unlawful to enter into contracts or grants requiring essentially equivalent effort. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award. 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, the proposer must so indicate on the Proposal Cover Sheet and provide the following information:

- (a) Name and address of the Federal Agency(s) to which a proposal was submitted, will be submitted, or from which an award is expected or has been received.
- (b) Date of proposal submission or date of award.
- (c) Title of proposal.
- (d) Name and title of principal investigator for each proposal submitted or award received.
- (e) 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.
- (f) If award was received, state contract number.
- (g) Specify the applicable topics for each SBIR proposal submitted or award received.

Note: If Section 3.5.b(10) does not apply, state in the proposal "No prior, current, or pending support for proposed work."

c. Cost Proposal. Complete the cost proposal in the format shown in the [Cost Breakdown Guidance](#), either using the online cost proposal form on the electronic submission website or as the last page(s) of your technical proposal. Some items in the [Cost Breakdown Guidance](#) 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 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 HSARPA unless it is determined that transfer of title to the contractor would be more cost effective than recovery of the equipment.
- (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 Phase I proposal.

Page Numbering and Bindings

Number all pages of your proposal consecutively. The cover sheets are pages 1 and 2. The technical proposal begins on page 3.

False Statements

Knowingly and willfully making any false, fictitious, or fraudulent statements or representations may be a felony under the Federal Criminal False Statement Act (18 U.S.C. §1001), punishable by a fine of up to \$10,000, up to five years in prison, or both.

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

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 the 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. A proposal that meets the goals of a solicitation topic but does not use the exact approach specified in the topic will be considered relevant. (Prospective proposers should contact the HSARPA SBIR program as described in Section 1.6 to determine whether submission of such a proposal would be useful.)

Proposals found to be relevant will then be evaluated using the criteria listed in Section 4.2. Final decisions will be made based upon these criteria and consideration of other factors including possible duplication of other work and program balance. 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 HSARPA 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.

Prior to receiving a contract award, the offeror must be registered in the Central Contractor Registration (CCR) database. For information regarding registration, call 1-888-227-2423 or visit www.ccr.gov.

Phase II proposals will be subject to a technical review process similar to Phase I. Final decisions will be made 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 DHS. HSARPA is not obligated to

make any awards under Phase II, and all awards are subject to the availability of funds. HSARPA is not responsible for any monies expended by the proposer before award of a contract.

Upon written request and after final award decisions have been announced, a debriefing will be provided to unsuccessful offerors on their proposals (see Section 6.4). Restrictive notices notwithstanding, proposals may be handled, for administrative purposes only, by support contractors. All support contractors are bound by appropriate non-disclosure agreements.

Evaluation Criteria - Phase I

HSARPA plans to select for award those proposals offering the best value to the Government and the nation considering the following factors in decreasing order:

- a. The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution.
- b. The qualifications of the proposed principal/key investigators, supporting staff, and consultants. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.
- c. The potential for commercial (Government or private sector) application and the benefits expected to accrue from this commercialization as assessed utilizing the criteria in Section 4.3.

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 and will count towards the 25-page limit.

Assessing Commercial Potential of Proposals

A Phase I or Phase II proposal's commercial potential will be assessed using the following criteria:

- a. The proposer's commercialization strategy (see Section 3.5.b(6)) and, as discussed in that strategy:
 - (1) any commitments of additional investment in the technology during Phase II from the private sector, prime contractors, non-SBIR programs, or other sources, and
 - (2) any Phase III follow-on funding commitments; and
- b. The proposer's record of commercializing its prior SBIR projects.

A report showing that the proposing firm has no prior Phase II awards will not affect the firm's ability to win an award. Such a firm's proposal will be evaluated for commercial potential based on its commercialization strategy in item a, above.

GOVERNMENT TRANSITION OF THE PROPOSED EFFORT IS VERY IMPORTANT. THE SMALL BUSINESS SHOULD INCLUDE THEIR TRANSITION VISION IN THEIR

COMMERCIALIZATION STRATEGY. THE SMALL BUSINESS MUST UNDERSTAND THE END USE OF THEIR EFFORT AND THE END USER.

5.0 CONTRACTUAL CONSIDERATIONS

Note: Eligibility and Limitation Requirements (Section 1.3) Will Be Enforced

Phase I Awards

- a. Number of Phase I Awards.** The number of Phase I awards will be consistent with the agency's 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. Proposers will be notified of selection/non-selection within three (3) months of the closing date of this solicitation.
- b. Type of Funding Agreement.** All winning proposals will be funded under negotiated contracts and may include a reasonable fee or profit consistent with normal profit margins provided to profit-making firms for Research/Research & Development work.
- c. Average Dollar Value of Awards.** Phase I awards to small businesses will typically cover a one-half person-year effort over a period generally not to exceed six months (subject to negotiation). Public Law 102-564 allows agencies to award Phase I contracts up to \$100,000 without justification.
- d. Timing of Phase I Awards.** The anticipated time between the date that this solicitation closes and the award of the Phase I is less than six (6) months.

Phase I Report

- 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 Standard Form (SF) 298, "Report Documentation Page," will be used as the first page of the report. (The Report Documentation Page may be printed from the HSARPA electronic submission website at <http://www.hsarpasbir.com>.) In addition, monthly status and progress reports may be required by HSARPA. This will be determined at contract award.
- b. Preparation.**
- (1) If desirable, language used by the company in its Phase II proposal to report Phase I progress may also be used in the final report.
 - (2) For each unclassified report, the company submitting the report should fill in block 12a (Distribution/Availability Statement) of the SF 298, "Report Documentation Page" with one of the following statements:
 - (a) Approved for public release; distribution unlimited.
 - (b) Distribution authorized to U.S. Government Agencies only; contains proprietary information. Note: The HSARPA, after reviewing the company's entry in block 12a, has final responsibility for assigning a distribution statement.

(3) Block 13 (Abstract) of the SF 298, "Report Documentation Page" must include as the first sentence, "Report developed under SBIR contract for topic [insert solicitation topic number]. The abstract 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. Since the abstract will be published by HSARPA, it must not contain any proprietary or classified data.

(4) Block 14 (Subject Terms) of the SF 298 must include the term "SBIR Report."

c. **Submission.** The company shall submit **FIVE COPIES** of the final report on each Phase I project in accordance with the Phase I contract and negotiated delivery schedule. Delivery will normally be within thirty days after completion of the Phase I technical effort. Detailed submission instructions will be provided at contract award.

Payment Schedule

The specific payment schedule (including payment amounts) for each contract will be incorporated into the contract upon completion of negotiations between the HSARPA 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 payments may be made. 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. In all cases, DHS must make payment to recipients under SBIR funding agreements in full, subject to audit, on or before the last day of the 12-month period beginning on the date of the completion of award. Other types of financial assistance may be available under the contract.

Markings of Proprietary Proposal Information

The proposal submitted in response to this solicitation may contain technical and other data that 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 the proposal cover sheet. 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 that constitutes a trade secret, proprietary commercial or financial information, or personal information or data it will be treated in confidence, to the extent permitted by law, provided this information is clearly marked by the proposer with the term "PROPRIETARY" (not "Company Confidential") and provided that the following legend that appears on the Proposal Cover Sheet of the proposal is completed:

"For any purpose other than to evaluate the proposal, this data except proposal cover sheet 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 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. The data subject to this restriction is contained on the pages of the proposal listed on the line below."

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 Sheet of this proposal."

If all of the information on a particular page is proprietary, the proposer should so note by including the word "PROPRIETARY" (not "Company Confidential") in both the header and footer on that page. 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 HSARPA 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 HSARPA pursuant to the Act is properly determined. *Classified Phase I proposals will not be accepted under the HSARPA SBIR program.*

Copyrights

With prior written permission of the contracting officer, the awardee may copyright (consistent with appropriate national security considerations, if any) material developed with HSARPA support. HSARPA receives a royalty-free license for the Federal Government and requires that each publication contain an appropriate acknowledgment and disclaimer statement.

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 period of five years to allow the awardee to pursue a patent.

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 generally remain with the contractor, except that the Government obtains a royalty-free license to use such technical data only for Government purposes during the period commencing with contract award and ending four years after completion of the project under which the data were generated. Upon expiration of the four-year restrictive license, the Government has unlimited rights in the SBIR data. During the license period, the Government may not release or disclose SBIR data to any person other than its support services contractors except (1) For evaluation purposes; (2) As expressly permitted by the contractor; or (3) A use, release, or disclosure that is necessary for emergency repair or overhaul of

items operated by the Government. See FAR clause 52.227-20, "Rights in Data -- SBIR Program."

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 that 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. **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 SBIR funding agreement, purchase only American-made items whenever possible.

Contractor Registration

Before HSARPA can award a contract to a successful proposer under this solicitation, the proposer must be registered in the Central Contractor Registration (CCR) database. The CCR allows Federal Government contractors or firms interested in conducting business with HSARPA to provide basic information on business capabilities and financial information. To register, visit www.ccr.gov or call 1-888-227-2423.

Invention Reporting

SBIR awardees must report inventions to the awarding agency within two (2) months of the inventor's report to the awardee. The reporting of inventions may be accomplished by submitting paper documentation, including fax, or through the Edison Invention Reporting System at www.iedison.gov.

Additional Information

- a. **General.** This Program Solicitation is intended for informational purposes and reflects current planning. If there is any inconsistency between the information contained herein and the terms of any resulting SBIR contract, the terms of the contract are controlling.
- b. **Small Business Data.** Before award of an SBIR 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.** Unsolicited proposals will not be accepted under the SBIR 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.** Classified proposals for Phase I are not accepted under the HSARPA SBIR program.

6.0 SUBMISSION OF PROPOSALS

Each proposal must be submitted on the HSARPA electronic submission website at <http://www.hsarpasbir.com> and contain a completed:

- Proposal Cover Sheet,
- Technical Proposal, and
- Cost Proposal.

Electronic Proposal Submission

For complete electronic proposal submission on the HSARPA electronic submission website, first prepare the proposal cover sheet (select "Prepare/Edit Phase I Cover Sheet" from the Main Menu). The website will assign the cover sheet a proposal number, which will be used for tracking throughout the submission process. Prepare the technical proposal in a single PDF file, check it for viruses, and upload it to the submission website following instructions on the website. The cost proposal may be submitted either using the on-line form or as the last page(s) of your technical proposal file. Technical proposals should be a single file, including all graphics and attachments, should have the company name and proposal number (from the cover sheets) in the header, and should be in Portable Document Format (PDF). Offerors are responsible for performing a virus check on each technical proposal prior to uploading. Every uploaded file will be scanned for viruses. If a virus is detected, the file will be deleted and may cause rejection of the proposal. Once uploaded, the technical proposal file may be viewed or downloaded from the website by clicking on the Check Upload button. Offerors are responsible for verifying that the technical proposal was received and converted properly. Technical proposals may be uploaded as often as necessary, each time overwriting the file previously submitted. Once a file is overwritten, the previous version is NOT retrievable. Offerors electing to modify their proposals in any way must allow enough time to upload a complete updated proposal. Failure to provide a complete modification by the solicitation closing will render the offeror's proposal as "late" regardless of whether the offeror had previously submitted a complete proposal. Signatures are not required on the cover sheets and cost proposal at the time of submission for electronic submission. If the proposal is selected for award, HSARPA will contact you for signatures.

Proposals are accepted from 19 November 2003 to 15 December 2003. Deadline for electronic receipt of proposals is 4:00 pm ET 15 December 2003. Proposals must be completely submitted to the HSARPA submission website by the specified closing time. Complete submission means that the entire proposal (including the following three (3) parts: cover sheets, technical proposal, and cost proposal) has been properly completed and fully transmitted to the HSARPA submission website. The solicitation deadline is firm. As the close date draws near, heavy traffic on the web server may cause delays. Plan ahead and leave ample time to prepare and submit your proposal. Offerors bear the risk of website inaccessibility due to heavy usage in the final hours before the solicitation closing time. In accordance with FAR 52.215-1, offerors are responsible for submitting proposals, and any modification, or revisions, so as to reach the Government office designated in the solicitation by the time specified in the solicitation. Any proposal, modification, or revision received at the Government office designated in the solicitation after the exact time specified for

receipt of offers is "late" and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late offer would not unduly delay the acquisition; and –

- (1) If it was transmitted through an electronic commerce method authorized by the solicitation, and it was received at the initial point of entry to the Government infrastructure no later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or
- (2) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of offers and was under the Government's control prior to the time set for receipt of offers; or
- (3) It is the only proposal received.

Acceptable evidence to establish the time of receipt at the Government installation includes documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel. Offerors are responsible for checking their proposal submission through the HSARPA electronic submission website (click on the Check Proposal icon to the right of the proposal number) to confirm that the proposal package is complete and readable. Proposals may be withdrawn by written notice 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.

Any modification or revision may not make the proposal longer than 25 pages. 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.

Notification of Proposal Receipt

Notification of receipt of proposal will be provided via e-mail.

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. Selections will be posted on the HSARPA SBIR website and Resource Center website approximately six months after the solicitation closing date.

Debriefing of Unsuccessful Offerors

An unsuccessful offeror that submits a written request for a debriefing within 30 days of being notified that its proposal was not selected for award will be provided a debriefing. The written request should be sent to HSARPA. An offeror that fails to submit a timely request is not entitled to a debriefing, although untimely debriefing requests may be accommodated at the Government's discretion.

Correspondence Relating to Proposals

All correspondence relating to proposals should cite the SBIR solicitation number, proposal number, and specific topic number.

7.0 SCIENTIFIC AND TECHNICAL INFORMATION

Scientific and technical reference information is provided with each individual topic provided in Section 8.0.

8.0 TECHNICAL TOPICS

This section contains detailed topic descriptions outlining the technical areas in which HSARPA requests proposals. Topics are listed and numbered separately.

HSARPA invests in programs offering the potential for revolutionary changes in technologies that promote homeland security or accelerates the prototyping and deployment of technologies that reduce homeland vulnerabilities. Thus, the HSARPA SBIR goal is to pursue as many innovative research ideas and concepts that promote homeland security with the potential for commercialization.

HSARPA has identified technical topics to which small businesses may respond in the first fiscal year (FY 2004) solicitation (FY04.1). Please note that these topics are UNCLASSIFIED and only UNCLASSIFIED Phase I proposals will be entertained. Although the topics are unclassified, the subject matter may be considered to be a "critical technology." If you plan to employ Non-U.S. citizens in the performance of an HSARPA SBIR contract, please identify these individuals in your proposal as specified in Section 3.5.b(7) of the program solicitation. A list of the topics currently eligible for proposal submission is included in this section followed by full topic descriptions. These are the only topics for which proposals will be accepted at this time.

ELECTRONIC SUBMISSION of Cover Sheet, Technical and Cost proposal **IS REQUIRED**. Only proposals submitted through the on-line submission website at <http://www.hsarpasbir.com> will be accepted or considered for award. Proposals must be prepared and submitted in accordance with the instructions below.

HELPFUL HINTS:

Consider the file size of the technical proposal to allow sufficient time for uploading.

- Perform a virus check.
- Signature is no longer required at the time of submission.
- If you encounter problems during electronic submission call toll free at 1-800-754-3043.
- Facsimile (fax) or e-mail proposals submissions will not be accepted.

Phase I proposals shall not exceed \$100,000, and should be a **six-month or less effort**.

HSARPA Phase II proposals must be invited by the respective Phase I HSARPA Program Manager. Phase II invitations will be based on the technical results reflected in the Phase I draft and/or final report as evaluated by the HSARPA Program Manager.

Prior to receiving a contract award, the small business **MUST** be registered in the Centralized Contractor Registration (CCR) Program. You may obtain registration information by calling 1-888-352-9333 and pressing 3 or Internet at www.ccr.gov.

SBIR proposals will be processed and distributed to the appropriate technical office within HSARPA for evaluation and action. Evaluation will be done by Government personnel. A support contractor who has signed appropriate non-disclosure agreements (NDAs) and non-conflict of interest forms will handle the proposals for administrative purposes only. HSARPA

selects proposals for funding based on technical merit and the evaluation criteria contained in this solicitation document.

As funding is limited, HSARPA reserves the right to select and fund only those proposals considered to be superior in overall technical quality and highly relevant to the DHS mission. As a result, HSARPA may fund more than one proposal in a specific topic area if the technical quality of the proposal(s) is deemed superior, or it may not fund any proposals in a topic area. Each proposal submitted to HSARPA must have a topic number and must be responsive to only one topic.

- Cost proposals will be considered to be binding for 180 days from closing date of solicitation.
- Successful offerors will be expected to begin work no later than 30 days after contract award.
- For planning purposes, the contract/grant award process is normally completed within 45 to 60 days from issuance of the selection notification letter to Phase I offerors.

The HSARPA SBIR Program plans to implement a Fast Track process for SBIR projects that attract matching cash from an outside investor for the Phase II SBIR effort. Additional information will be provided on Fast Track Applications to Phase I awardees.

HSARPA TOPICS -- HSARPA Small Business Fiscal Year 04 Publication 1

H-SB04.1-001	NEW SYSTEM/TECHNOLOGIES TO DETECT LOW VAPOR PRESSURE CHEMICALS (E.G. TICs)
H-SB04.1-002	CHEM-BIO SENSORS EMPLOYING NOVEL RECEPTOR SCAFFOLDS
H-SB04.1-003	ADVANCED LOW COST AEROSOL COLLECTORS FOR SURVEILLANCE SENSORS AND PERSONAL MONITORING
H-SB04.1-004	COMPUTER MODELLING TOOL FOR VULNERABILITY ASSESSMENT OF U.S. INFRASTRUCTURE
H-SB04.1-005	MARINE ASSET TAG TRACKING SYSTEM
H-SB04.1-006	AIS TRACKING AND COLLISION AVOIDANCE EQUIPMENT FOR SMALL BOATS
H-SB04.1-007	SHIP COMPARTMENT INSPECTION DEVICE
H-SB04.1-008	ADVANCED SECURE SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) AND RELATED DISTRIBUTED CONTROL SYSTEMS

SBIR TOPIC NUMBER: H-SB04.1-001

TITLE: NEW SYSTEM/TECHNOLOGIES TO DETECT LOW VAPOR PRESSURE CHEMICALS (E.G., TICS)

TECHNOLOGY AREAS: Chemical Defense, Sensors

OBJECTIVE: Develop a new system for the rapid and accurate detection of low vapor pressure chemicals, particularly toxic industrial chemicals.

DESCRIPTION: Most traditional chemical point detectors are designed to alert upon sensing a vapor phase analyte. This approach requires that the vapor flux of the analyte be sufficient to permit detection schemas with low false positive alert rates to operate in a cluttered background. For highly volatile compounds, such an approach is generally satisfactory; however, it does not serve well for low vapor pressure (LVP) chemicals. These species typically will have vapor pressures of 10^{-3} to 10^{-6} mm Hg at ambient temperatures and include many toxic industrial chemicals (TICs). In the absence of sample heating -- not practical in most environments -- the vapor flux of such compositions are unadaptable to vapor phase sensing. Thus, DHS S&T seeks proposals from SBIR bidders that are directed at alternative systems and technologies to detect such compounds.

PHASE I: Develop a concept for an LVP chemical detector. During the first phase, the performer will propose a conceptual detector or detection system. Formal design of the concept will be performed and a preliminary design review and report will be generated. As part of the final report, plans for Phase II will be proposed. Underpinning science/engineering for design either must be demonstrated or already defended by examples and/or references to comparable systems.

PHASE II: The design from Phase I will be formalized. All appropriate engineering testing and validation of design issues will be performed. A critical design review will be performed to finalize the design and a prototype laboratory unit will demonstrated.

PHASE III COMMERCIAL APPLICATIONS: Technology products or services developed under this effort will have significant commercial, as well as homeland security applications. For example, improved field units for detecting low-vapor pressure agents would fill a niche not currently satisfied by present technology systems and would thus convey a competitive advantage in this area. Such a system may be marketed to chemical production facilities for monitoring manufacturing and/or storage facilities, as well as the integrity of chemical transport containers or vulnerable transportation nodes. That usage could contribute to reduced manpower requirements for security and integrity monitoring, as well as reductions in hazards to employees and surrounding communities. This type of system might also be marketed to state and local Governments for much the same purpose.

REFERENCES: Use web-sites or references easily found through the National Technical Information Service (NTIS) or the Defense Technical Information Center (DTIC).

KEYWORDS: Toxic Industrial Chemicals, TICs, Low-Vapor Pressure, LVP

SBIR TOPIC NUMBER: H-SB04.1-002

TITLE: CHEM-BIO SENSORS EMPLOYING NOVEL RECEPTOR SCAFFOLDS

TECHNOLOGY AREAS: Chemical and Biological Sensors

OBJECTIVE: Provide a definitive demonstration of advantages of alternative receptor scaffolds in a prototype chemical or biological sensor.

DESCRIPTION: Currently fielded receptor-based chemical and biological sensors employ antibodies as receptor scaffolds to bind agents. This approach, although acceptable for short-term solutions, suffers from inherent difficulties. These include 1) the difficulty of developing and producing polyclonal serum from which monoclonal antibodies having optimal characteristics for sensor applications can be reliably selected; 2) the logistical difficulty of maintaining a commercially viable stock of such monoclonal antibodies as reagents for commercial sensors, 3) the lack of long-term shelf life and stability of antibodies under conditions required for many detector platforms, and 4) the lack of a general method to use the power of protein engineering and directed evolution to optimize monoclonal antibodies for specific sensor applications.

Within the past few years a number of alternative approaches to antibodies for potential use in receptor-based chemical and biological sensors have been reported. Many of these potentially offer powerful technological solutions to the inherent limitations of antibodies mentioned above. Despite this fact, these alternative receptor scaffolds have yet to be employed in commercially available sensors, and part of the S&T community believe that they have not yet been demonstrated to function as well as antibodies in these systems.

PHASE I: Demonstrate the efficacy, utility, and advantage of using alternative receptor scaffolds in chemical and biological sensors for Homeland Security applications. Phase I examples must employ receptors for chemical or biological analytes for which there already exist antibody-based sensor systems, and demonstrate clearly what particular advantages accrue from employing the alternative receptors.

PHASE II: Develop a commercially viable laboratory prototype of such a sensor. Phase II prototypes must demonstrate that the alternative receptors exhibit performance, logistical, and/or cost advantages over the best available antibody-based commercial sensors for the same analyte.

PHASE III COMMERCIAL APPLICATIONS: New technology successfully developed in this program with transition to commercial products for federal, state, and local Homeland Security applications. In addition, this technology has commercial potential for medical diagnostics and DoD applications.

REFERENCES

1. Looger, L.L., Dwyer, M.A., Smith, J.J., Hellinga, H.W., Computational Design of Receptor and Sensor Proteins with Novel Functions, Nature. 2003 May 8; 423(6936):185-90.
2. Rajendran, M., Ellington, A.D., Selecting Nucleic Acids for Biosensor Applications, Comb Chem High Throughput Screen. 2002 June; 5(4): 263-70.

KEYWORDS: Chemical Sensor, Biosensor, Receptor Scaffolds, Antibody Alternatives.

SBIR TOPIC NUMBER: H-SB04.1-003

TITLE: ADVANCED LOW COST AEROSOL COLLECTORS FOR SURVEILLANCE SENSORS AND PERSONAL MONITORING

TECHNOLOGY AREAS: Sensors

OBJECTIVE: Develop a next generation of low cost, low power consumption aerosol collector-concentrators. These collector-concentrators will collect large input air volumes capturing most of the aerosol particulates in the respirable range in a significantly reduced output stream of either air or liquid.

DESCRIPTION: Currently available aerosol collector-concentrators for surveillance sensors are typically expensive and sub-optimal in their collection efficiencies at high collection volumes. Most current components rely upon precise and expensive machining in an attempt to optimize performance. Since the aerosol collector is the interface from the environment to the analysis stage for surveillance sensors systems, high input collection volume, high efficiency collectors translate directly into higher sensitivity devices.

PHASE I: Develop a design for a low cost, high efficiency, high collection volume aerosol collector-concentrator which has low power consumption. Perform laboratory validations of the key sub-components for the aerosol collector-concentrator design.

PHASE II: Build and characterize a prototype for the aerosol collector-concentrator and demonstrate a path to low manufactured cost.

PHASE III: COMMERCIAL APPLICATIONS: In addition to bio-defense applications, aerosol collector-concentrators have numerous applications in environmental monitoring for pollutants.

REFERENCES: Use web-sites or references easily found through the National Technical Information Service (NTIS) or the Defense Technical Information Center (DTIC).

KEYWORDS: Aerosol, Collector, Surveillance, Sensors

SBIR TOPIC NUMBER: H-SB04.1-004

TITLE: COMPUTER MODELLING TOOL FOR VULNERABILITY ASSESSMENT OF U.S. INFRASTRUCTURE

TECHNOLOGY AREAS: Modeling and Simulation Technology

OBJECTIVE: Develop and validate a modeling tool to automatically derive the likely targeting of critical U.S. infrastructure by specific terrorist groups and across general terrorist tactics (e.g., suicide bombing, etc.). The resultant model will yield a risk distribution based upon the targeting signatures of specific terrorist groups and general terrorist tactics across multiple terrorist groups mapped against specific U.S. infrastructure. Projected benefit of this modeling tool will be to augment current force protection strategies to include vulnerability analysis and security resource allocation.

DESCRIPTION: Since 1990 there have been in excess of 750 terrorist attacks perpetrated against U.S. assets (CONUS and OCONUS). These attacks have been against a wide range of target characteristics: Government, Military, and a variety of commercial interests to include transportation, financial, and entertainment. As a result, the United States strategy is increasingly focused upon developing vulnerability detection technology to better allocate its short- and long-term security resources against terrorist attacks in general. Research advances in the areas of data mining, link analysis, and pattern matching offer additional specificity by identifying potential vulnerabilities on a case-by-case basis. However, this technology by itself falls significantly short of supporting the U.S.'s need to develop a comprehensive vulnerability analysis based upon the targeting characteristics of specific terrorist groups actively threatening the U.S., especially those groups that share a common set of tactics such as bombings, assassinations, etc. Technology shortcomings include fusing geographic, feature, behavior, and temporal analysis into a single target analysis model. In an effort to meet the objective of this SBIR, research may draw upon existing models, architectures, and techniques or create new ones. However, the approach should yield a significantly enhanced capability in the following areas: real-time group-specific target analysis, trend analysis, and automated projection of these signatures against U.S. assets.

PHASE I: Develop a concept design of the target analysis system to include the projected data requirements, functional flowchart, and system design. The Phase I metrics will include the derivation of targeting signatures for at least two terrorist organizations spanning at least a three year period using only open source information.

PHASE II: Develop an end-to-end prototype target analysis tool, to include a demonstration of 1) deriving in real-time the target signatures for the two groups from Phase I, 2) deriving in real-time the target signatures for a third terrorist group outside of the Phase I research, and 3) generalizing the targeting signatures of each of the three terrorist groups to one or more major U.S. metropolitan areas. The implementation must include complete documentation to allow for direct replication of methods and results across each group. DHS anticipates that this work will be done at Secret level.

PHASE III COMMERCIAL APPLICATIONS: The development of a real-time target analysis tool will have a very strong commercial potential with applications such as law enforcement (security agencies such as DHS, FBI, DEA, and Secret Service), municipal planning, emergency management response (FEMA), international corporations, and non-government organizations (Red Cross). The generation of group-specific target projections for major U.S. metropolitan areas

will allow both Government and private industry to better assess their risk and thus better focus their indication and warning projections and associated security resources.

KEYWORDS: Target Analysis, Force Protection, Threat Assessment

REFERENCES:

1. Brown, D.E., (1998). The Regional Crime Analysis Program (RECAP): A Framework for Mining Data to Catch Criminals. IEEE, 2848-2853.

CLOSED

SBIR TOPIC NUMBER: H-SB04.1-005

TITLE: MARINE ASSET TAG TRACKING SYSTEM

TECHNOLOGY AREAS: Tags, Shipping Container Tracking

OBJECTIVE: Develop and prototype Tag System (using RF, IR or other modality) for shipping containers that will operate in the marine environment while (a) being loaded stacked aboard ship, (b) on board deck of a ship in a stack, (c) unloaded, and (d) moved and stacked in shipping terminals.

DESCRIPTION: Present shipping container tag systems require a clear path signal from a GPS satellite for positioning and a similar clear line of sight for satellite communications link. Such systems work perfectly well in trucking and rail applications, where the container is a single entity and in the open. In the marine environment, however, containers are closely stacked both on deck and in a ship's hold. On deck the stacking can reach six or more high, twelve or more containers athwartship and twenty or more fore and aft. Both on deck and in the hold the containers are placed with a density that allows less than a foot between the containers on all sides. The blockage provided by surrounding containers, ship's holds, and staging warehouses makes normal GPS / satellite tag configurations unworkable.

The position and condition of containers needs to be monitored while being loaded and intermittently while at sea. If an inspection of a container is called for (through intelligence warning or irregularities in a manifest for example) a clear indication of the location of the container and its approximate position on the ship or in the terminal facilities is makes access timely and expedient. Cargo tracking of the container should indicate where it was loaded, when, and in what approximate position it was loaded on the ship. There are a number of container integrity sensor capabilities being developed, which could alert a remote monitor if the container was or is being tampered with (door seals, mechanical sensors, etc.). To be effective at sea or in a terminal environment, such sensors must be able to transmit a signal despite the container being buried in a stack. During the ship voyage, intermittent polling of the status and condition of the container is needed for both security and cargo condition tracking.

This SBIR looks for innovative solutions to allow monitoring of containers while stacked, either afloat or ashore. The concept is a combination of three integrated elements: (1) a Container Tag, (2) a Local Transmitter and Receiver Net, and (3) a Data Center.

The Container Tag would use low power signals (RF, IR, or other) that would allow transmission and propagation between the stacked containers. The frequencies used, power and signal characteristics are a subject of Phase I of the SBIR. The Container Tag would respond to a query polling with a unique identification number, authentication, and status. The Container Tag would have interfaces with environmental and security sensors and be able to interrogate and pass data from these sensors. These sensors may monitor the condition of the container, record critical parameters (high temperature, shock, vibration, etc.) and events (movement, security breach). While these adjunct sensors are not a subject of this SBIR, the Container Tag must provide a means to interface with, query, and pass data from a variety of such sensors.

The basic Container Tag functions are: upon query transmit: (a) a unique ID number with authentication (responding to a code in the query signal?), (b) a timing / location signal, (c) tag status, (d) battery condition, (e) any stored sensor messages, and if requested (f) query interfaced

sensors. The Container Tag must be battery powered and have a lifetime of one year. It must have propagation and signal characteristics which will allow it to pass data between stacked containers to an antenna outside the container stack.

The Local Transmitter and Receiver Net would be mounted on board the ship and at the terminal facility. It would have an antenna and transceiver network which would allow it to receive and query the Container Tags while stacked on deck or in the terminal. (Query in the hold of the ship may be more difficult, but possible). The Local Transmitter and Receiver Net should have the ability to locate the container and tag on board the ship or in the terminal to within one container (one stack and level). The Local Transmitters and Receiver Net may be physically configured in any number of topologies of transmitters, receivers and antennas, both on board ship and ashore (a subject of Phase I study). The Local Transmitter and Receiver Net must be configured to automatically query and collect data from a container while the container is being moved, loaded or unloaded. Local Transmitter and Receiver Net will collect, authenticate, record and forward container information to the Data Center using a satellite communications system. Each Local Transmitter and Receiver Net will have one or more processors which will poll, query and collect data from the Container Tags, format bills of lading showing the containers in the facility or aboard the ship, their positions, unique ID's, any alerts and messages and local history of movement. The Local Transmitter and Receiver Net aboard the ship will also have a GPS receiver which will provide the ship location. In addition, the Local Transmitter and Receiver Net should be capable of receiving and responding to queries about container position and status from the Data Center.

The Data Center resides at a shipper's control center or a DHS facility. It receives information from the Local Transmitter and Receiver Nets at shipping facilities and ships at sea, correlates the container information with manifests, bills of lading, and ship information. It transmits with the Local Transmitters and Receiver Net using a satellite communications link (to be determined).

PHASE I: Develop the overall architecture and design for the marine asset tracking system. Conduct a trade study on the Container Tag itself, determining frequency, signal and data characteristics for the tag. Design authentication and security features. Estimate lifetime and interfaces with attached or adjunct sensors. Design the Local Transmitters and Receiver Net for a ship application.

PHASE II: Build a prototype Container Tag and Local Transmitters and Receiver Net, installing and demonstrating at an appropriate container facility.

PHASE III COMMERCIAL APPLICATIONS: Complete the Global Data Center, interface with other container sensors, develop and operate a pilot program with a shipping line.

REFERENCES:

1. Institute for Electronics and Electrical Engineers Standard IEEE 1451.2-1997

KEYWORDS: Shipping container, Intermodal cargo, security monitoring, Radio frequency tags, marine transportation

SBIR TOPIC NUMBER: H-SB04.1-006

TITLE: AIS TRACKING AND COLLISION AVOIDANCE EQUIPMENT FOR SMALL BOATS

TECHNOLOGY AREAS: Maritime Platforms

OBJECTIVE: Develop for use on small boats an inexpensive marine vessel tracking and collision warning device. The device's design is based upon the definition of an Automatic Identification System (AIS) "Class B Basic" unit as established by the International Electrotechnical Commission. A "Class B Basic" device is intended to meet the minimum requirements for a mobile AIS device. The goal of this research is the production of units with a retail cost of less than \$250. This research should also investigate and incorporate processes and displays that assist a user in detecting and avoiding hazardous navigational conditions.

DESCRIPTION: Automatic Identification System technology is being developed to improve the safety and security of mariners. Significant operational and technical background material can be found in the first two references below. Efforts are currently underway at the International Electrotechnical Commission (IEC) to develop a minimum international standard for AIS equipment. This equipment will be safe for use by recreational boaters without disrupting the AIS performance needed by professional mariners. The IEC is currently developing the minimum requirements, and IEC participation as part of this research would be encouraged. The equipment developed during this research must be designed such that it can meet all the applicable "Class B Basic" test criteria as defined in the International Electrotechnical Commission 62287 international standard; "Class B shipborne equipment of the universal automatic identification system (AIS) – Operational and performance requirements, methods of test and required test results." For example The "Class B Basic" equipment requires that the GPS be an integral part of the unit. The "Class B Basic" also allows for options. The design developed under this research must include the "Class B Basic" options that are required for AIS operation in U.S. waters. The "Class B Basic" does not restrict inclusion of additional features that improve the user interface or improve the navigation process. This research should investigate the ability of the unit to monitor all received AIS signals and address the issues of providing the user with automatic maneuvering recommendations or advisory information, such as, the danger of an imminent collision or burdened / privileged status. The research should also address the human factor and cost issues of presenting information to the user.

PHASE I: This phase of the research will consist of developing:

- a design that uses techniques and methods that enable the manufacturing of economical devices that can meet the testing requirements for an IEC 62287 "Class B Basic" AIS unit,
- presentation methods for delivering navigation warnings and recommendations to the user,
- algorithms / methods capable of detecting hazardous navigational condition, and
- recommendation synthesis methods that can assist the user in making intelligent navigational decisions.

PHASE II: The design from Phase I will be constructed and pre-production units subjected to the IEC certification tests as described in IEC 62287.

PHASE III COMMERCIAL APPLICATIONS: The collision avoidance and vessel tracking capabilities will serve to improve the safety of individuals operating their small vessels, such as, recreational boats, and other vessels that are not required to carry and operate Class A units by statute and/or USCG regulations. The wide use of these devices will improve the ability for waterways management and security operations to maintain persistent surveillance of large and small vessel movements using a common sensor infrastructure.

REFERENCES:

International Association of Marine Aids-to-Navigation and Lighthouse Authorities (IALA), IALA Guidelines on the Universal Automatic Identification (AIS) - Volume 1, Part 1 - Operational Issues. (available free at: <http://www.iala-aism.org/mainsite/pages/english/p4/p4f4.htm>)

IALA, IALA Guidelines on the Universal Automatic Identification (AIS) - Volume 1, Part 2 - Technical Issues. (available free at: <http://www.iala-aism.org/mainsite/pages/english/p4/p4f4.htm>)

ITU-R Recommendation M.1371-1, Technical characteristics for a universal shipborne automatic identification system using time division multiple access in the VHF maritime mobile band. (available for a fee at: <http://www.itu.int/publications/online/index.html>)

IALA, IALA Technical Clarifications on Recommendation ITU-R M.1371-1. (available free at: <http://www.iala-aism.org/mainsite/pages/english/p4/p4e.htm>)

International Electrotechnical Commission 61993-2 ED 1, Class A shipborne equipment of the universal automatic identification system (AIS) - Operational and performance requirements, methods of test and required test results. (available free at: [http://www.navcen.uscg.gov/marcomms/iec/file 80-315e.pdf](http://www.navcen.uscg.gov/marcomms/iec/file%2080-315e.pdf))

International Electrotechnical Commission 62287, Class B shipborne equipment of the universal automatic identification system (AIS) - Operational and performance requirements, methods of test and required test results. (available free as a working draft from the International Electrotechnical Commission's Technical Committee 80 working group 8A)

KEYWORDS: Automatic Identification System, AIS, MDA, Class B, vessel tracking, collision avoidance, recreational AIS.

SBIR TOPIC NUMBER: H-SB04.1-007

TITLE: SHIP COMPARTMENT INSPECTION DEVICE

TECHNOLOGY AREAS: Maritime Platforms

OBJECTIVE: Develop a handheld, man-portable instrument that can accurately analyze & provide information on material hidden from vision behind walls, bulkheads, etc. Any device or instrument must minimize disruption of commercial and private properties yet ensure full space accountability. The equipment will be used by a broad range of Coast Guard personnel with little or no advanced technical education and should require minimal training to become efficient in its operation.

DESCRIPTION: Individual or organizations engaged in smuggling illegal migrants and contraband have developed countless ingenious methods for hiding their illegal cargo aboard ships and boats. Coast Guard boarding teams use space accountability as one method of ensuring that a vessel is not carrying illegal migrants or other contraband. Currently, spaces, cargo containers, and tanks must be subjected to visual inspections or invasive procedures, such as cutting openings, inspection ports, etc. to ensure space accountability. These measures are time consuming, resource intensive, and have a high probability of causing damage to the vessel and its cargo, and/or injury to boarding team members. A technology, or device is needed that will reduce the time, amount of resources, minimize damage and enhance the safe operating condition of CG boarding personnel. Proposed solutions must be capable of detecting and locating clandestine cargo, identifying false bottoms, false walls, etc. and providing highly accurate information on the complex shapes of ship tanks, compartments, and even hull sections to the equipment operator without a loss or degradation in data quality or damage to compounds and other materials internal to tanks, holds and other hard to access areas (hulls).

PHASE I: The Phase I research effort would consist of a feasibility study and an in-depth investigation into technologies that would achieve the objectives. Phase I efforts would result in a formal design of the proposed solution including preliminary design and a technical report on expected performance. As part of the final report, plans for Phase II will be proposed.

PHASE II: The design from Phase I will be finalized. All appropriate engineering testing and validation of design issues will be performed. A critical design review will be performed to finalize the design and a prototype unit will be manufactured.

PHASE III COMMERCIAL APPLICATIONS: Several units of the device will be manufactured and a series of qualification tests will be performed to validate the design and performance. There is a military and commercial application of this technology in non-intrusive container inspection.

REFERENCES:

1. Hidden Compartments Handbook; U.S. Navy; ONI-2540-001-00, 1999
2. USCG Research & Development Center; Ultrasonic Flashlight Probe (UFP) Report No. 5630.5.7-03-01 (Internal USCG Report), 2003

KEYWORDS: Non-intrusive, Space accountability

SBIR TOPIC NUMBER: H-SB04.1-008

TITLE: ADVANCED SECURE SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) AND RELATED DISTRIBUTED CONTROL SYSTEMS

TECHNOLOGY AREAS: Sensors, Control Systems, Networking, Cyber-Security

OBJECTIVE: DHS is seeking innovative ideas to protect SCADA systems from attack. Approaches should reduce the vulnerability to cyber (hacking, etc.) and/or physical (power overload, etc.) attacks. Proposals must have the potential to develop low cost affordable solutions. As SCADA systems are often built from sensors and actuators from many firms, solutions are sought that are not vendor specific. In addition, DHS is seeking innovative methods to conduct vulnerability assessments of SCADA systems in all industry sectors (electric power generation and distribution, water and waste treatment, chemical processing, petrochemical refining and distribution, food processing, etc.).

DESCRIPTION: SCADA is a term used to describe control and data acquisition systems that are integral to many critical infrastructures (e.g., electrical power grid, water, gas, and oil pipelines, etc.). Depending on the specific installation and configuration these systems also carry the moniker of distributed control systems (DCS). Although SCADA and DCS can be delineated, for the purpose of this SBIR Topic, SCADA and DCS will be referred to as SCADA systems.

Historically the primary motivation behind the automation of control functions, like turning valves on and off, has been one of convenience. Likewise, the primary reason that many SCADA systems are now sharing the same networks as business systems and e-mail servers is to increase efficiency and allow systems administrators and SCADA operators to manage many devices from remote locations. What has become painfully obvious since September 11, 2001 is that these systems and the critical infrastructures they control represent a significant target for any adversary.

PHASE I: Develop a concept to better protect SCADA systems. During the first phase, the performer will propose a conceptual approach. Formal design of the concept will be preformed and a preliminary design review and report will be generated. As part of the final report, plans for Phase II will be proposed.

PHASE II: The design from Phase I will be finalized. All appropriate engineering testing and validation of design issues will be performed. A critical design review will be performing to finalize the design and any prototype hardware and/or software will be constructed and tested.

PHASE III COMMERCIAL APPLICATIONS: The prototype hardware and/or software from Phase II will be refined to near production quality and a series of qualification tests will be performed to validate the design and its performance. As the majority of our Nation's critical infrastructure is privately owned, the largest market for successful technology from this SBIR Topic will be the commercial sector.

REFERENCES:

1. National Infrastructure Protection Center, Terrorist Interest in Water Supply and SCADA Systems, Information Bulletin 02-001, 30 January 2002:
<http://www.nipc.gov/publications/infobulletins/2002/ib02-001.htm>
2. AGA/GTI SCADA Security Initiative: http://www.opusss.com/scada_security.htm

3. UTC SCADA Security Conference:

<http://www.utc.org/index.v3page;jsessionid=g3bnp9ffoxup?p=31808>

KEYWORDS: SCADA, distributed control systems, cyber-security

CLOSED

HSARPA FY2004.1 Phase I SBIR Checklist

Page Numbering

- Number all pages of your proposal consecutively
- Total for each proposal is 25 pages inclusive of cover sheets, technical proposal, cost proposal and resumes
- Beyond the 25 page limit do not send appendices, attachments and/or additional references

Proposal Format:

- Cover Sheet, Technical and Cost proposals MUST be submitted electronically at <http://www.hsarpasbir.com>

The Technical Proposal addresses:

- Identification and Significance of Problem or Opportunity
- Phase I Technical Objectives
- Phase I Work Plan
- Related Work
- Relationship with Future Research and/or Development
- Commercialization Strategy
- Key Personnel, Resumes
- Facilities/Equipment
- Consultants
- Prior, Current, or Pending Support

Final checklist:

- The Cover Sheets were prepared on-line.
- The Cost Proposal shows detailed cost breakout and the total cost is also listed on the Cover Sheets