

**Office Of The Secretary Of Defense (OSD)  
Deputy Director Of Defense Research & Engineering  
Deputy Under Secretary Of Defense (Science & Technology)  
Small Business Technology Transfer Research (STTR)  
FY 2008.A Program Description**

## **Introduction**

The Deputy Under Secretary of Defense (Science & Technology) STTR Program is sponsoring a Cognitive Readiness technology theme in this solicitation.

The Army is participating in the OSD program this year. The service laboratories act as our OSD Agent in the management and execution of the contracts with small businesses. The service laboratories, often referred to as a DoD Component acting on behalf of the OSD, invite small business firms to submit proposals under this Small Business Technology Transfer Research (STTR) Program solicitation. In order to participate in the OSD STTR Program this year, all potential proposers should register on the DoD SBIR/STTR website as soon as you can, and should follow the instruction for electronic submittal of proposals. It is required that all bidders submit their proposal cover sheet, company commercialization report and their firm's technical and cost proposal form electronically through the DoD SBIR/STTR Proposal Submission Website at <http://www.dodsbir.net/submission>. If you experience problems submitting your proposal, call the help desk (toll free) at 1-866-724-7457. You must include a Company Commercialization Report as part of each proposal you submit; however, it does not count against the proposal page limit. Please note that improper handling of this form may result in the proposal being substantially delayed. Information provided may have a direct impact on the review of the proposal. The DoD SBIR/STTR Proposal Submission Website allows your company to come in any time (prior to the proposal submission deadline) to edit your Cover Sheets, Technical and Cost Proposal and Company Commercialization Report.

**We WILL NOT accept any proposals that are not submitted through the on-line submission site.** The submission site does not limit the overall file size for each electronic proposal, there is only a page limit. However, file uploads may take a great deal of time depending on your file size and your internet server connection speed. If you wish to upload a very large file, it is highly recommended that you submit prior to the deadline submittal date, as the last day is heavily trafficked. You are responsible for performing a virus check on each technical proposal file to be uploaded electronically. The detection of a virus on any submission may be cause for the rejection of the proposal. We will not accept e-mail submissions.

Firms with strong research and development capabilities in science or engineering in any of the topic areas described in this section and with the ability to commercialize the results are encouraged to participate. Subject to availability of funds, the DUSD(S&T) STTR Program will support high quality research and development proposals of innovative concepts to solve the listed defense-related scientific or engineering problems, especially those concepts that also have high potential for commercialization in the private sector. Objectives of the DUSD(S&T) STTR Program include stimulating technological innovation, strengthening the role of small business in meeting DoD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DoD-supported research and development results. The guidelines presented in the solicitation incorporate and exploit the flexibility of the SBA Policy Directive to encourage proposals based on scientific and technical approaches most likely to yield results important to DoD and the private sector.

## **Description of the OSD STTR Three Phase Program**

Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas submitted under the STTR Program and will typically be one half-person year effort over a period not to exceed six months, with a dollar value up to \$100,000. We plan to fund 3 Phase I contracts, on average, and downselect to one Phase II contract per topic. This is assuming that the proposals are sufficient in quality to fund this many. Proposals should concentrate on that research and development which will significantly contribute to proving the scientific and technical feasibility of the proposed effort, the successful completion of which is a prerequisite for further DoD support in Phase II. The measure of Phase I success includes technical performance toward the topic objectives and

evaluations of the extent to which Phase II results would have the potential to yield a product or process of continuing importance to DoD and the private sector, in accordance with Section 4.3.

Subsequent Phase II awards will be made to firms on the basis of results from the Phase I effort and the scientific and technical merit of the Phase II proposal in addressing the goals and objectives described in the topic. Phase II awards will typically cover 2 to 5 person-years of effort over a period generally not to exceed 24 months (subject to negotiation). Phase II is the principal research and development effort and is expected to produce a well defined deliverable prototype or process. A more comprehensive proposal will be required for Phase II.

Under Phase III, the DoD may award non-STTR funded follow-on contracts for products or processes, which meet the component mission needs. This solicitation is designed, in part, to encourage the conversion of federally sponsored research and development innovation into private sector applications. The small business is expected to use non-federal capital to pursue private sector applications of the research and development.

This solicitation is for Phase I proposals only. Any proposal submitted under prior STTR solicitations will not be considered under this solicitation; however, offerors who were not awarded a contract in response to a particular topic under prior STTR solicitations are free to update or modify and submit the same or modified proposal if it is responsive to any of the topics listed in this section.

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, and have successfully completed their Phase I efforts, will be invited to submit a Phase II proposal. Invitations to submit Phase II proposals will be released at or before the end of the Phase I period of performance. The decision to invite a Phase II proposal will be made based upon the success of the Phase I contract to meet the technical goals of the topic, as well as the overall merit based upon the criteria in section 4.3. DoD is not obligated to make any awards under Phase I, II, or III. DoD is not responsible for any money expended by the proposer before award of any contract. For specifics regarding the evaluation and award of Phase I or II contracts, please read the front section of this solicitation very carefully. Every Phase II proposal will be reviewed for overall merit based upon the criteria in section 4.3 of this solicitation, repeated below:

- 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 (defense and private sector) application and the benefits expected to accrue from this commercialization.

In addition, the OSD STTR Program has a Phase II Plus Program, which provides matching STTR funds to expand an existing Phase II contract that attracts investment funds from a DoD acquisition program, a non-SBIR/non-STTR government program or Private sector investments. Phase II Plus allows for an existing Phase II OSD STTR contract to be extended for up to one year per Phase II Plus application, to perform additional research and development. Phase II Plus matching funds will be provided on a one-for-one basis up to a maximum \$500,000 of STTR funds. All Phase II Plus awards are subject to acceptance, review, and selection of candidate projects, are subject to availability of funding, and successful negotiation and award of a Phase II Plus contract modification. The funds provided by the DoD acquisition program or a non-SBIR/non-STTR government program must be obligated on the OSD Phase II contract as a modification prior to or concurrent with the OSD STTR funds. Private sector funds must be deemed an "outside investor" which may include such entities as another company, or an investor. It does not include the owners or family members, or affiliates of the small business (13 CFR 121.103).

The Fast Track provisions in section 4.0 of this solicitation apply as follows. Under the Fast Track policy, STTR projects that attract matching cash from an outside investor for their Phase II effort have an opportunity to receive interim funding between Phases I and II, to be evaluated for Phase II under an expedited process, and to be selected for Phase II award provided they meet or exceed the technical thresholds and have met their Phase I technical goals, as discussed in Section 4.5. Under the Fast Track Program, a company submits a Fast Track application, including statement of work and cost estimate, within 120 to 180 days of the award of a Phase I contract (see the Fast Track Application Form on [www.dodsbir.net/submission](http://www.dodsbir.net/submission)). Also submitted at this time is a

commitment of third party funding for Phase II. Subsequently, the company must submit its Phase I Final Report and its Phase II proposal no later than 210 days after the effective date of Phase I, and must certify, within 45 days of being selected for Phase II award, that all matching funds have been transferred to the company. For projects that qualify for the Fast Track (as discussed in Section 4.5), DoD will evaluate the Phase II proposals in an expedited manner in accordance with the above criteria, and may select these proposals for Phase II award provided: (1) they meet or exceed selection criteria (a) and (b) above and (2) the project has substantially met its Phase I technical goals (and assuming budgetary and other programmatic factors are met, as discussed in Section 4.1). Fast Track proposals, having attracted matching cash from an outside investor, presumptively meet criterion (c). However, selection and award of a Fast Track proposal is not mandated and DoD retains the discretion not to select or fund any Fast Track proposal.

### **Follow-On Funding**

In addition to supporting scientific and engineering research and development, another important goal of the program is conversion of DoD-supported research and development into commercial products. Proposers are encouraged to obtain a contingent commitment for private follow-on funding prior to Phase II where it is felt that the research and development has commercial potential in the private sector. Proposers who feel that their research and development have the potential to meet private sector market needs, in addition to meeting DoD objectives, are encouraged to obtain non-federal follow-on funding for Phase III to pursue private sector development. The commitment should be obtained during the course of Phase I performance. This commitment may be contingent upon the DoD supported development meeting some specific technical objectives in Phase II which if met, would justify non-federal funding to pursue further development for commercial purposes in Phase III. The recipient will be permitted to obtain commercial rights to any invention made in either Phase I or Phase II, subject to the patent policies stated elsewhere in this solicitation.

### **Contact with DoD**

General informational questions pertaining to proposal instructions contained in this solicitation should be directed to the topic authors and point of contact identified in the topic description section. Proposals should be electronically submitted. Oral communications with DoD personnel regarding the technical content of this solicitation during the pre-solicitation phase are allowed, however, proposal evaluation is conducted only on the written submittal. Oral communications during the pre-solicitation period should be considered informal, and will not be factored into the selection for award of contracts. Oral communications subsequent to the pre-solicitation period, during the Phase I proposal preparation periods are prohibited for reasons of competitive fairness. Refer to the front section of the solicitation for the exact dates.

### **Proposal Submission**

Proposals shall be submitted in response to a specific topic identified in the following topic description sections. The topics listed are the only topics for which proposals will be accepted. Scientific and technical information assistance may be requested by using the SBIR/STTR Interactive Technical Information System (SITIS).

It is required that all bidders submit their proposal cover sheet, company commercialization report and their firm's technical and cost proposal form electronically through the DoD SBIR/STTR Proposal Submission Website at <http://www.dodsbir.net/submission>. If you experience problems submitting your proposal, call the help desk (toll free) at 866-724-7457. You must include a Company Commercialization Report as part of each proposal you submit; however, it does not count against the proposal page limit. Please note that improper handling of this form may result in the proposal being substantially delayed. Information provided may have a direct impact on the review of the proposal. The proposal submission website allows your company to come in any time (prior to the proposal submission deadline) to edit your Cover Sheets, Technical and Cost Proposal and Company Commercialization Report. We **WILL NOT accept any proposals which are not submitted through the on-line submission site**. The submission site does not limit the overall file size for each electronic proposal, only the number of pages are limited. However, file uploads may take a great deal of time depending on your file size and your internet server connection speed. You are responsible for performing a virus check on each technical proposal

file to be uploaded electronically. The detection of a virus on any submission may be cause for the rejection of the proposal. We will not accept e-mail submissions.

The following is a summary of the technology areas, which are followed by the topics.

**Cognitive Readiness Technology Focus Area: Social, Cultural, and Language Tools for Analysis, Decision and Training Systems**

Our national security depends upon our ability to operate militarily with socio-cultural agility and effects in these regions. Our forces must be able to not only project military power, but also provide for stability, security, transition, and reconstruction efforts globally. To do this requires, at all levels of our force structure, an appreciation of the intricacies of societies and tribal cultures and the complexity of human-to-human interactions. We need targeted and tailored technology products that are applicable to the troops working at the tactical level, and analysts and leaders at the operational and strategic level.

This theme supports research that utilizes innovative technologies, such as serious game environments, that can be used to develop relevant models and to push the envelope on providing new analysis, decision support, and training capabilities in social, cultural and language domains for the deployed warfighter in organizational echelons from combat teams to Joint Task Force Headquarters. The focus of these topics is developing unique and operationally relevant models and content. Topics seek validated socio-cultural models and content with demonstrated use-case effectiveness. They seek to provide the interactive, dynamic environments that would support better cultural awareness. The technologies should be extensible beyond current operations in Iraq and Afghanistan to other regions and military kinetic and non-kinetic scenarios. Networkable, remote-capable products are desirable with emphasis on insertion into systems of record and Just In Time training environments. Training related topics require SCORM compliance and the adoption of existing /emerging standards for training of language and cultural skills.

The Cognitive Readiness Technology topics are:

- OSD08-T001 Automatic Identification & Mitigation of Unauthorized Information Leaking from Enterprise Networks (Army)
- OSD08-T002 Automation of Technical Reachback for PMESII Best Practices and Lessons Learned in Stabilization and Reconstruction Environments (Army)
- OSD08-T003 Linking Output Activity to Outcomes/Impacts in Complex Contingency Environments (Army)

## OSD STTR 08.A Topic Descriptions

OSD08-T001    TITLE: Automatic Identification & Mitigation of Unauthorized Information Leaking from Enterprise Networks

TECHNOLOGY AREAS: Information Systems

OBJECTIVE: Attacks against computer networks will often inject unauthorized software such as botnets, spyware, Remote Administration Trojans, peer-to-peer software, or stealthy worms. Once running inside an enterprise network, the malicious code may collect sensitive or secret information and send it out of the targeted networks. The objective of this STTR is to research and develop automatic identification and mitigation techniques to detect and stop unauthorized information leaking emanating from an enterprise networks. New techniques and implementations are needed to monitor out-bound network connections for unauthorized traffic flows, stop or shunt these traffic flows, and identify the machine(s) that generated the traffic for further investigation and remediation.

DESCRIPTION: Network intrusion detection systems (NIDS) can aid in detecting malicious attacks against enterprise networks. However, NIDS are ineffective at addressing malicious software that is already running resident on internal hosts. Spyware, botnets, Remote Administration Trojans, key loggers, peer-to-peer file sharing, remote monitoring, and control software can run within networks collecting and transmitting information, threatening a system's confidentiality. Current commercial anti-spyware systems are not effective at finding all spyware and other malicious software because the malicious software can hide from detection, or the detection signatures are out-of-date. Passive network monitoring devices that do not require host-based communication, offer an approach to detect and stop unauthorized information leakage. This STTR examines the research and development of a system that can automatically identify and mitigate data exfiltration from unauthorized out-bound traffic flows.

The general task of identifying and mitigating unauthorized network traffic flows is challenging for several reasons. The most significant of these are: (i) a large set of programs is generating a lot of traffic at any time, (ii) packets emitted from a single program are highly variable with time, machine, and user, (iii) malicious software will often embed itself in legitimate software using authorized software as a host for sending out malicious packets, and (iv) network traffic should be processed in near real-time in order to allow control decisions to be made on current sessions. To address these issues, techniques that can properly classify network traffic and distinguish malicious traffic flows from legitimate traffic flows emanating from an authorized program will be highly desired.

PHASE I: a. Research and develop network traffic flow classification algorithm(s) that can accurately distinguish malicious traffic flows within a network on a real-time basis.  
b. Demonstrate that the proposed algorithm(s) suitably scale for enterprise networks consisting of different classes of malicious traffic flows.

PHASE II: a. Develop a working system that automatically classifies network traffic flows and demonstrate successful operation on live traffic.  
b. Conduct comprehensive benchmarking experiments using synthetic traffic generators (both benign and malicious), and various programs and malicious software to demonstrate the successful detection of unauthorized data exfiltration under varying amounts of network load.  
c. Demonstrate the advantages of this approach by comparing against existing tools and techniques for identifying malicious programs running inside networks.

PHASE III/DUAL USE APPLICATIONS: Effective network intrusion detection and information leakage mitigation is a critical capability for both the military and commercial sectors. The developed technology will be useable on both the government networks, as well as commercial networks. The developed system should be marketed as a standalone product or can be licensed to a third party.

KEYWORDS: IDS system, network traffic classification, network fingerprinting, information leakage, data exfiltration

OSD08-T002     TITLE: Automation of Technical Reachback for PMESII Best Practices and Lessons Learned in Stabilization and Reconstruction Environments

TECHNOLOGY AREAS: Human Systems

OBJECTIVE: Provide US military planners and their USG interagency partners with an automated technical reachback capability built on best practices and lessons learned across key sectors.

DESCRIPTION: The successful accomplishment of US national objectives goes beyond just combat operations and requires US military planners to plan, prepare and conduct operations across many levels of conflict/warfare. DoD Directive 3000.05 signed 28 November 2005, mandates that: "U.S. military forces shall be prepared to perform all tasks necessary to establish or maintain order when civilians cannot do so." Concerted efforts on the part of USJFCOM, Army, Marine Corps, SOCOM, the US Department of State's Office of the Coordinator for Reconstruction and Stabilization (S/CRS), and the US Agency for International Development (USAID) have built considerable collections of best practices and lessons learned across sectors: security, rule of law, governance, economic growth and social well-being. These best practices incorporate social, cultural and geo-political knowledge that can help define appropriate subordinate objectives and activities for accomplishing National Security goals in complex contingency environments.

Across the USG agencies, the body of knowledge represented by best practices and lessons learned is not readily available to stabilization and reconstruction practitioners in theater. In today's environment, the professional on the ground frequently has neither the specialized expertise needed, nor the time and resources necessary, to identify the best solution to address the objective. An effective program consists of attaining both appropriate (to the local environment) and quality (use of best technical approaches) results for the reconstruction task before him/her. For example, to develop a comprehensive program focused on decreasing poppy exportation Afghanistan, alternative livelihoods need to be developed with local input and use a variety of technical approaches, such as regional border security, rural agriculture techniques in 3rd world environments, watershed analysis and management techniques applicable to the specific region, market analysis methodologies appropriate for the task and environment, etc. All of these elements, including local involvement, rely on use of best practices and lessons learned to achieve effective results.

Efficient access to a comprehensive set of best practices is becoming increasingly important as DoD stands ready to fill the gap for civilians in stabilization and reconstruction environments as mandated in DoD 3000.05. Building on the foundation of lessons learned and best practices of the institutions mentioned above and others, timely access to, integration of and analysis of these best practices is urgently needed across sectors to enable DoD and civilian staff to perform their duties. Technical reachback to this information in support of DoD and civilian staff in theater is critical for timely delivery of appropriate and high-quality programs and projects in stabilization and reconstruction environments.

PHASE I: With input from USJFCOM, Center for Army Lessons Learned, S/CRS, USAID and USACAPOC and others, develop an automated, open source methodology for accessing, analyzing and tailoring best practices and lessons learned for sectors across key sectors: security, rule of law, governance, economic growth and social well-being. The best practices and lessons learned should be focused on, but not limited to, those gathered from stabilization and reconstruction environments. Implement examples from at least three distinct sectors, including relevant additional materials from a broad range of other organizations such as universities, think tanks, development banks and international and non-governmental organizations. Collect and evaluate examples of technical reachback systems in use by DoD, USAID and others to develop a menu of approaches that would work within contracting frameworks of the USG in theater.

PHASE II: Once demonstrated that a workable methodology and process exists, develop and demonstrate a software capability that enables best practices to be accessed by field components through Reachback capabilities. Insure this capability utilizes open-architecture and enterprise techniques that are web-enabled using industry and government standards for web applications such that it is interoperable with other USG systems. Adjust the system as required based on customer feedback. Test the capability for accessing, analyzing and tailoring best practices and lessons learned in specific stabilization and reconstruction environment(s) based on Phase I results. Identify how the

methodology will be incorporated into the Military Decision Making Process (MDMP). Provide a set of minimum requirements for successful use of the capability by practitioners in theater, including IT, personnel and budgetary estimates.

DUAL USE COMMERCIALIZATION: Has USG-wide and possibly Multination and International application (United Nations, NATO).

#### REFERENCES:

1. USG Draft Planning Framework for Reconstruction, Stabilization and Conflict Transformation, USJFCOM J7 Pamphlet, version 1.0, 1 December 2005, [http://www.dtic.mil/doctrine/jel/other\\_pubs/jwfcam\\_draft.pdf](http://www.dtic.mil/doctrine/jel/other_pubs/jwfcam_draft.pdf)
2. DoD Directive 3000.05, <http://www.mil/whs/directives/corres/pdf/300005p.pdf>

KEYWORDS: technical reachback, lessons learned, stabilization, reconstruction, best practices, PMESII

OSD08-T003     TITLE: Linking Output Activity to Outcomes/Impacts in Complex Contingency Environments

TECHNOLOGY AREAS: Human Systems

OBJECTIVE: Research, design, and evaluate an innovative approach for linking the output of stabilization and reconstruction (peace-building) activities/tasks to desired overall mission outcomes/impacts.

DESCRIPTION: The ability of national, international or multinational organizations to accurately monitor and evaluate progress towards establishing a viable peace or addressing the causes underlying conflict at a country or regional-level is impeded by an inability to “link” actions, tasks and/or projects (termed “projects” for this description) at the implementation-level to broader mission-level, desired outcomes. Most often, these projects are often undertaken within an agency (UNHCR, USAID, DoD) and/or within a sectoral/functional stovepipe (Security, Governance, Rule of Law, Humanitarian Assistance), and the project success is measured in terms of outputs (# schools built, # police trained, tons of food delivered, #immunizations delivered). At the mission-level however, success is measured in terms of outcomes/impacts, which are broader indications of progress and effectiveness (enhancing governmental legitimacy, diminishing political violence, strengthening the private sector, diminishing societal cleavages). Currently, there is a gap between outcome/impact measures and output measures of each individual project. A simple aggregation of the successful output of each project from the individual “stovepipes” as a means to assess mission-level progress is inaccurate and misleading. However, all projects, activities and tasks should be in support of broader, desired mission outcomes/impacts.

Through a project entitled “Measuring Progress in Conflict Environments” (MPICE), the Dept of State, USAID, US Institute of Peace and DOD collaborated in developing a measurement framework focused specifically on outcomes across 5 sectors (Political Moderation, Security, Rule of Law, Economic Sustainability and Social Well-Being). This framework addresses both Institutional Performance as well as Drivers of Conflict components. While the Framework is intentionally generic and comprehensive, tailoring procedures have been documented to develop a set of outcome measures appropriate for specific missions and environments. MPICE currently does not substantially and rigorously link the measures of effectiveness focused on outcomes to measures of performance or outputs of actual activities on-the-ground. The MPICE framework is available through the link in the References section below.

This research will develop a methodology and process to “link” planned/on-going implementation-level projects/activities/tasks to broader mission-level outcomes/impacts within a common software operating environment. The software should be able to assimilate activities/tasks from multiple sources/agencies and organizations (governmental, international or private) into an “MS project-like” environment for the purposes of organization into sectors, functions or other groupings. The software should be able to identify critical paths and interdependencies between activities/tasks and the effect of changes from one activity on the others through their interdependencies. Each activity/task should be able to incorporate, monitor and store output-based evaluation data. The research will then determine how best to “link” or “nest” these activities to broader mission outcomes/impacts determined during mission planning (or soon thereafter) for the purposes of ensuring impact and cohesion between

plan and activity. The software should be able to “import” a tailored set of MPICE indicators and measures or be able to input the same type of outcome measures from another source or plan. Finally, the software should provide a visualization capability to display the relationship between planned outcomes and implementation activity for practitioners. Explore and further define and enhance requirements to enable this visualization capability with GIS technology.

PHASE I: Using a recent stabilization and reconstruction mission or a robust case study develop and successfully demonstrate a methodology and process to meaningfully link outputs from ongoing projects/activities/tasks with broader, mission-level outcomes/impacts as represented in the MPICE framework for the purposes of cohesion and impact with stated, mission-level goals.

PHASE II: Develop and demonstrate a software capability that documents and links the project description, management and output success measurement “pieces” to the higher-level outcomes/impacts available in the MPICE framework. Insure this capability utilizes open-architecture and enterprise techniques that are web-enabled using industry and government standards for web applications such that it is interoperable with other USG systems such as the MPICE computerized tool. Adjust the system as required based on customer feedback. Finally, develop a visualization capability to assist practitioners in the field, as well as USG coordination and oversight managers in Washington DC.

PRIVATE SECTOR COMMERCIAL POTENTIAL: While the technology is being developed to support Operational-level (Mission-level) efforts, this technology is also useful for Homeland Defense/Security missions. The distinction between the two is statutory. This technology could be as useful during domestic disaster/incident response as it would be for foreign applications. A commercial entity could adopt this software and improve it for sale to state, county, and municipal governments.

#### REFERENCES:

1. USG Draft Planning Framework for Reconstruction, Stabilization and Conflict Transformation, USJFCOM J7 Pamphlet, version 1.0, 1 December 2005, [http://www.dtic.mil/doctrine/jel/other\\_pubs/jwfc pam\\_draft.pdf](http://www.dtic.mil/doctrine/jel/other_pubs/jwfc pam_draft.pdf)
2. DoD Directive 3000.05, <http://www.mil/whs/directives/corres/pdf/300005p.pdf>
3. Measuring Progress in Conflict Environments Framework.

KEYWORDS: stability and reconstruction, output, outcome, impact.