

**NATIONAL SCIENCE FOUNDATION
ARLINGTON, VA 22230**

**Engineering Directorate
Division of Industrial Innovation and Partnerships**

Report of the
Advisory Committee for
Small Business Innovation Research (SBIR) and
Small Business Technology Transfer (STTR)
Programs

17-18 April 2007

1.0 INTRODUCTION

The National Science Foundation (NSF) Advisory Committee (AdCom) for the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs met April 17-18 2007 at the Key Bridge Marriot, near the NSF Headquarters facility in Arlington, VA.

Advisory Committee members in attendance were:

Ms. Trish Costello	Dr. Karthik Ramani
Mr. Albert Johnson	Dr. David B. Spencer
Dr. Karen Kerr	Dr. E. Jennings Taylor (Chairman)
Mr. Tom Knight	Dr. Carole A. Teolis
Ms. Penny K. Pickett	

Advisory Committee members absent: Dr. Sudhir Bhagwan, Dr. Chris Busch, Dr. Edward Getty, Mr. Richard Paul, Dr. Lizette Velazquez, Ms. Meg Wilson

NSF representatives attending all or part of the meeting included:

- Ms. Cheryl Albus, SBIR Program Manager
- Dr. Thomas Allnutt, SBIR Program Manager
- Dr. Ali Andalibi, SBIR Program Manager
- Dr. Errol Arkilic, SBIR Program Manager
- Dr. Ian Bennett, SBIR Program Manager
- Dr. Babu Dasgupta, SBIR Program Manager
- Dr. Juan E. Figueroa, SBIR Program Manager
- Dr. Joe Hennessey, Senior Advisor, Industrial Innovation and Partnerships
- Dr. Kesh Narayanan, Director, Industrial Innovation and Partnerships
- Dr. Murali Nair, SBIR Program Manager
- Dr. Robert Norwood, I/UCRC Program Manager
- Dr. Mike Reischman, Deputy Assistant Director, Engineering Directorate
- Dr. T. James Rudd, SBIR Program Manager
- Dr. George Vermont, SBIR Expert

NSF Support Staff

- Mr. Patrick Ravanera
- Mr. James Murphy

NSF Triumph Technologies SBIR/STTR Project Team

- Ms. Michelle Wood

Visitor

- Dr. Tyrone Taylor, Capital Advisors on Technology

2.0 ACTIVITIES SUMMARY

Tuesday, 17 April 2007

2.1 INTRODUCTION AND WELCOME

Kesh Narayanan opened the meeting and introduced Dr. Michael Reischman (NSF Deputy Assistant Director, Engineering Directorate).

Mike Reischman addressed the AdCom and thanked the AdCom in advance for their diligent activities. In addition, Mike asked the AdCom for comment on the SBIR/STTR COV Report. In particular, Mike asked the AdCom for comment regarding

1. Analytical Methods/Metrics for Assessing the Effectiveness of the SBIR/STTR Program
2. Models for Innovation/Commercialization Relevant to the SBIR/STTR Program
3. New Approaches for Management of the SBIR/STTR Program
4. Clarification of Societal Benefits for the SBIR/STTR Program

James Murphy distributed and explained the Conflict of Interest documentation. Said documentation was distributed to the AdCom members for review and signature.

The January 2006 meeting AdCom Report was previously approved by e-mail.

Kesh Narayanan welcomed Karthik Ramani as a new member of the AdCom. Several briefings for consideration by the AdCom followed these introductory remarks .

2.2 BRIEFINGS

Overview of SBIR/STTR Programs

Briefings regarding various sectors of the SBIR/STTR programs, since the reorganization and formation of the Division for Industrial Innovation and Partnerships (IIP), followed:

1. Electronics Sector – Juan Figueroa, Bill Haines, Murali Nair, James Rudd
2. Information Technology & Emerging Opportunities Sector – Ian Bennett, Errol Arkilic
3. Biotechnology Sector – Thomas Allnutt, Ali Andalibi
4. Advanced Materials, Chemical Technologies and Manufacturing Sector – Deepak Bhat, Rathindra DasGupta, Cheryl Albus

Commercialization Outcomes

George Vermont presented the methodology and results from the SBIR/STTR on-going commercialization outcomes survey. A lengthy discussion followed.

Review of the COV Process and Findings

E. Jennings Taylor summarized the SBIR/STTR COV process and the report findings. Joe Hennessey listed and led a discussion of the twelve specific recommendations from the COV report. The recommendations from the COV are inserted verbatim herein:

1. Sufficient funds for monitoring and technical assistance to grant recipients

NSF and the SBIR/STTR programs uniquely require sufficient funds to enable its staff to monitor grant recipients, provide training and technical assistance, and for related management support. In addition, ways need to be found to reduce the percent of turnover of Program Managers and support staff evidenced over the past three years and to institutionalize processes where appropriate, such as the way to conduct a topic selection workshop, to preserve best practices in cases of turnover. In addition, program management should consider other ways such as video conferencing, net meetings, and other technological means to increase monitoring to the extent travel resources are limiting. Travel funds for Program Officers to conduct targeted site visits of their grantees, especially for Phase II/IIBs, should be allocated/increased.

2. Focused attention on analysis and program evaluation of the SBIR/STTR Program.

The 2004 COV report suggested that the SBIR/STTR program shift resources from national outreach conferences to other functions including data analysis. Since then the SBIR/STTR management has increased its focus on data management. Even so, this COV suggests dedicated staff resources be available to continue and enhance data management and assessment and that this data be increasingly used to support Program Managers in development and management of the SBIR/STTR. The increasing size of the SBIR/STTR program necessitates increased focus on analysis and program evaluation, something in which the NSF SBIR/STTR has always excelled, compared to other Federal agencies (See GAO report). Implementation of this recommendation will continue to place NSF among the forefront of Federal agencies in the content management of their SBIR/STTR program. Additional staff dedicated to this area, for example, could assist in documenting and validating Phase II commercialization plans.

3. Development of a process documentation/standardization program for SBIR/STTR.

The COV suggests that the SBIR/STTR program management investigate whether adoption of a process documentation and standardization program can help build a stronger institutional memory base for the program. The COV recognizes that the program officers demonstrate a strong skill base in both technical and business related areas. Due to the recent larger turnover of staff and possible expansion it is important that there be sufficient documentation in place to enable new staff to continue this successful management of a large number of proposals and programs. In particular, selection of topics, reviewer selection and orientation, panel management and selection, review and program officer summary standardization -- will mitigate the difficulties associated with staff turnover and program growth.

4. Further briefing of SBIR/STTR Reviewers on Models of Innovation and Technology Commercialization

The COV feels that further education of SBIR/STTR reviewers on models of innovation and technology commercialization pathways which recipients of awards might pursue may prove useful. This should be done prior to the review process beginning, through inclusion of training materials on FastLane and/or revisiting of materials now used when reviewers arrive at NSF for panels. Review of panel jackets suggests some reviewers are not fully aware of alternative commercialization paths outside their specific expertise. This could also be implemented via a multimedia presentation to prospective panel members.

5. Consistent Commercialization Path Definition

The SBIR/STTR Program needs to insist on a common message about the four commercialization paths. There needs to be greater consistency among contractors providing outreach on commercialization to applicants, SBIR/STTR Program Managers, materials presented at Grantee and other outreach activities, using common models, definitions, and approaches when discussing models of innovation and technology commercialization (See number 4 above). Towards this end, the COV recommends the NSF explore a collaboration with the Kaufman Foundation on their “FastTrac® TechVenture™ Program” and/or “Planning the Entrepreneurship Venture (PEV)” curriculum for SBIR/STTR.

6. Continued development of new approaches and ideas in the management of the SBIR/STTR Program

The COV commends the SBIR/STTR management team for its efforts over the three year time period of this review for initiating leading edge practices and approaches within NSF such as its response to the President’s Manufacturing Innovation initiative to solicit and receive a number of applications and awards in this area; its development of an “emerging opportunities” set of topics in the annual solicitations; and its linkages of SBIR to other programs within NSF. The COV commends the SBIR/STTR Program Managers for their creative approaches to better link the SBIR/STTR program with other programs within NSF. The list of joint endeavors is most encouraging whether it’s educational supplements to enable SBIR/STTR recipients to hire underrepresented students, to enable SBIR/STTR recipients to join I/UCRC Centers, and many other examples. This is a model for emulation by other programs within NSF and recognizes the organizational synergy within IIP.

7. Clarification of Criterion “Societal Benefit” in SBIR/STTR Reviews

The COV review of SBIR/STTR proposal packets suggests some confusion by reviewers of at least one of the two primary NSF wide criteria. The second criterion – societal benefit – seems to often be interpreted by reviewers as only addressing education and talent issues. SBIR/STTR Program Managers, correctly in the view of the COV, interpret this as meaning technology commercialization primarily, and, secondarily, other societal benefits, including education. The COV suggests that the SBIR/STTR Program Management consider breaking the second criterion into two parts: (1) technology commercialization; and (2) other societal benefit. Furthermore, in sending initial information to reviewers, in the initial briefing for reviewers at NSF, and at panel reviews, there needs to be a further educational effort to explain the primary and secondary components of this criterion as it applies to the SBIR/STTR program. Thus, there needs to be an improvement in the process to ensure that proposals are funded which have both scientific and technical and commercial merit. Proposals that have high S&T scores but low Commercialization Plan scores – or visa versa - should not be recommended for funding. Another alternative is to add an overall third criterion – innovation – in which case the societal benefit criterion would not need to be split into two parts.

8. Increased use of non-academic reviewers in Phase I and Phase II SBIR/STTR Reviews

It is important to the success of the SBIR/STTR program to insure that the marketplace of industry, risk capitalists and economic development specialists helps review and validate the potential of SBIR/STTR applicants to turn ideas into commercial opportunities. The COV believes continued attention needs to be given to insuring more such reviewers with these backgrounds are included in Phase II and Phase I review teams. To the extent possible using the same commercial reviewers for a Phase I review should continue in Phase II.

9. Review of Commercial Potential in Phase I Reviews.

It is not possible to expect a full commercial review of Phase I applications. Phase I is to investigate feasibility. However, as it is now being tried in the emerging opportunities solicitations, additional information on commercialization can be required in the Phase I application, particularly information to insure that the applicant is already thinking about alternative paths or models toward technology

commercialization. During Phase I, applicants could be asked about product applications or to use market opportunity or intelligence to identify and to discuss possible commercialization paths.

10. Other Commercialization Issues

There are a number of related issues the COV observed from its Jacket reviews for further consideration by SBIR/STTR Program Management:

1. Highlight more prominently past performance/experience in reviews, even in Phase I proposals. This would be implemented by requiring a prior award report to be included in the Phase I proposal. Management has increased the focus on this and should continue and expand this in reference to recommendation 2 above.
2. Consider whether having technical assistance up to \$4,000 per recipient for technology commercialization support by an NSF-selected outside contractor is the most appropriate approach. Alternatives include relying more on matching state support; focusing this assistance only on Phase II recipients; or other combinations. The result of these efforts should be reviewed in the future. The SBIR/STTR program should continue to critically track and review the effectiveness of commercialization contractor performance. Alternative commercialization contract assistance models should be considered.

11. Program Management

The COV commends the SBIR/STTR Program Management for managing a larger and larger work load of applications and funded proposals and insuring reports are filed on time and meet all requirements. The management of this large program continues to show improvement in spite of limited staff resources. Additionally, the SBIR/STTR program should continually assess the balance between risk/reward within its portfolio.

12. University Involvement in STTR

While the COV did not have time to explore this matter fully, it suggests that the SBIR/STTR program staff review and explore how universities have been involved in the STTR program in recent years. Building a strong university/small business interface is an important way to link ideas and innovation. In particular, in STTR proposals, the nature of the small business relationship and role needs to be further evaluated and reviewed.

The formal meeting adjourned at approximately 5:00 PM on this date.

Wednesday, 18 April 2007

Outreach Activities

Juan Figuerora presented information regarding outreach activities within IIP at NSF.

Tyrone Taylor presented a briefing titled "Outreach Activities for Minorities, Disadvantaged Persons and Women in the Federal Government". Tyrone Taylor provided a final report documenting the outreach activities to the AdCom.

In order to consolidate the twelve recommendations into manageable groups, Karen Kerr suggested the following categories:

- A. Program Impact
 - 2. Analysis and Program Evaluation
 - 11. Program Management and Portfolio Balance
 - 7. Clarification of Societal Benefit

- B. Panels/Panel Training
 - 4. Models of Innovation and Technology Commercialization
 - 5. Commercialization Path Definition
 - 7. Clarification of Societal Benefits
 - 8,9. Earlier Use of Commercial Reviewers

- C. Grantee Support
 - 1. Sufficient Program Officer Funds
 - 10. Grant Contractor Effectiveness

- D. Internal Program Management
 - 3. Process Documentation/Standardization
 - 6. Development of New Management Approaches
 - 12. University Involvement in STTR

Note that recommendation No. 7 was included in two groups. These groupings were endorsed by the AdCom.

The AdCom divided into two groups to provide discussion and commentary on the above categories of the COV report.

3.0 COMMENTS AND RECOMMENDATIONS

The items below are the specific recommendations of the AdCom after discussion of the COV Report and Recommendations:

3.1 COV RECOMMENDATIONS

Program Impact

The AdCom recommends that the SBIR/STTR maintain sufficient (e.g. 0.2) FTEs annually to focus on post-grant interviews with awardees as a means of monitoring program outcomes and success in meeting its mandate. Furthermore, the Committee recommends that an independent research organization be retained to assist the IIP Division/ENG Directorate in analysing the Commercialization Outcomes Survey data and in enhancing the survey tool to better capture key success metrics resulting from NSF SBIR/STTR funding. The AdComm recommends adding revenues generated and jobs created as well as total leverage of NSF dollars obtained as a result of additional investment by financial and strategic investors. This analysis should be designed to identify critical success factors that positively influence commercialisation success, so that these

factors can be incorporated into future commercialisation assistance efforts and proposal review criteria.

Additionally, the AdCom recommends that an analysis of the portfolio of awarded grants be conducted to assess the level of technical and business risk encompassed, and to determine if sufficient high risk / high impact proposals addressing new technologies in new markets are represented. The Committee believes that the SBIR/STTR program should have a focus on funding small business falling within the “capital chasm” between government support for innovative research and private sector financing of proven technologies in existing markets.

The AdCom endorses the COV finding that technology commercialization in and of itself is one of the broader societal benefits resulting from the SBIR/STTR program. The Committee further believes, however, that the SBIR/STTR program plays a vital role focusing attention on areas of national priorities (i.e. manufacturing, alternative energy/clean tech, security) as well as in education, increasing opportunities for women and minorities, and in seeding businesses in underdeveloped regions in the US.

Panels/Panel Training

The AdCom concurs with the COV that review panel training regarding the various commercialization models endorsed by the IIP as well as definitions of innovation and societal benefits would be beneficial. In addition, the AdCom recommends that commercial reviewers be used earlier in the review process.

Grantee Support

The AdCom believes that a \$50K budget for travel to oversee over \$100M in annual awards is insufficient and constrains effective program management. The insufficient funds for travel does not support the objective of best management practices. The Committee once again recommends that sufficient funds (e.g. \$250K) be allocated annually to enable the staff to monitor on-going grants, to provide assistance and guidance to grant recipients, and to develop networks to recruit more high impact companies and companies from rural and under represented groups into the program. In order to achieve organizational excellence in this area, the AdCom recommends that the issue be addressed at the Director level.

The AdCom recommends that the commercialization support program be expanded to allow for differentiated assistance as a function of need. By examining this topic that has been discussed frequently, the Committee recognizes that there is no one, ‘cookie cutter / one-size/fits-all’ approach to technical assistance beneficial to grantees. The SBIR/STTR program should consider awarding first time awardees commercialization assistance of less than the currently allowable \$4K in assistance on a per award basis, and consider allowing for more commercialization assistance contractors to better address the geographic dispersion of the grantees. The Committee also recommends looking for regionally based sources of technical assistance or mentoring close to a grantees’ location.

Internal Program Management

The AdCom recognizes the development of process/procedure documentation/standardization is critical to the effective management of the SBIR/STTR program and is not to be underestimated.

The AdCom endorses the documentation of processes and procedures to provide effective training of new program managers and maintain organizational excellence. The AdCom suggests that recommendation regarding industry-university partnerships be broadened to include more than just STTR by encouraging collaboration between small business, industry and universities in order to best leverage NSF investment. Note the important distinction that the AdCom addresses between small business and corporate industry, i.e. large business. This should include education opportunities in technology management for universities.

3.2 OUTREACH ACTIVITIES

The AdCom commends the IIP for initiating the outreach studies, both internal and external. The AdCom believes that the main challenge in increasing underrepresented group participation in SBIR/STTR is increasing the proposal submission rate. Consequently, the AdCom suggests that the IIP undertake activities such as collaborating with new partners (associations, student groups, technical assistance resources, etc.) to market and publicize SBIR/STTR opportunities to underrepresented groups.

The AdCom formed a subcommittee to address outreach activities to underrepresented businesses in general and women led companies in particular. The committee will be chaired by Trish Costello with additional members of Karen Kerr, Tom Knight, Penny Picket and Patty Greene.

After reporting briefly to the program team, the meeting adjourned at approximately 12:00 Noon.

4.0 FUTURE MEETING SCHEDULE

The next AdCom meetings are scheduled for:

- 1) May 17, 2007
Kansas City, MO in conjunction with the Grantees Conference co-hosted by the Kauffman Foundation
- 2) October 22-23, 2007
(NSF Headquarters, Arlington, VA)