FY 2007 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: January 23-26, 2007
Program/Cluster/Section: Small Business Innovation Research/Small Business Technology Transfer Research (SBIR/STTR)
Division: Industrial Innovation & Partnership (IIP)
Directorate: Engineering
Number of actions reviewed: Awards: 60 Declinations: 40 Other:
Total number of actions within Program/Cluster/Division during period under review: Awards: 1555 Declinations: 4559 Other:
Manner in which reviewed actions were selected: **By a statistical sampling of standard awards, supplements and declinations.**

PART A. INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question**.** Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE [1]
1. Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) **Comments:** The review mechanisms for the SBIR/STTR Phase I and Phase II are	**YES**

[1] If "Not Applicable" please explain why in the "Comments" section.

exceptional. The commercialization review in Phase II which pairs commercial and technical reviewers on an equal basis, is unique within NSF, appropriate and innovative – even among the other SBIR/STTR federal agencies. We strongly endorse this practice. Our further comments are all given in the context of a process of continual improvement. Most of the panel reviews were detailed and appropriate. The diversity of the reviewers regarding sector, experience and gender varied greatly between panels. Panel discussions are an excellent review mechanism and the effort to reflect panel discussion in the written panel summaries in order to provide better feedback to applicants should be continued.	
2. Is the review process efficient and effective? **Comments:** Overall the review process is very efficient and, given the number of applications, it's simply amazing this process seems to work so efficiently. The use of Fastlane aids in the effectiveness of the process. The SBIR/STTR program's capacity to manage a large volume of proposals efficiently is laudable.	**YES**
3. Do the individual reviews (either mail or panel) provide sufficient information for the Principal Investigator(s) to understand the basis for the reviewer's recommendation? **Comments:** While there is a wide discrepancy in the quality of the individual reviews, in aggregate, they provide sufficient information to the applicant PI. The use of a strengths/weaknesses analysis has improved the quality of the review process. However, more guidance and direction should be provided to the reviewers earlier in the process to encourage them to provide more substantive comments and reasoning behind their observations and recommendations and to align their comments with the goals and objectives of the SBIR/STTR program. (see detailed recommendations in Section C)	**YES**
4. Do the panel summaries provide sufficient information for the Principal Investigator(s) to understand the basis for the panel recommendation? **Comments:** Overall, the panel summaries provide sufficient information to the PIs. However, the quality of the panel summaries varied somewhat. Sometimes, the Phase I panel summaries reflected the written individual	**YES**

reviews rather than consistently including a synthesis of the panel discussion and written comments. Some panels provided additional information to the PI summarizing strengths and weaknesses of the proposal and this seems to be increasingly the case for subsequent years of the COV's review. This analysis should be continued and encouraged. In some cases, the Panel Summaries did not properly reflect the significance of the Commercial Plan reviews. Some reviews found major problems with the financing and revenue stream section of the proposals which were not reflected in the review summary nor were they weighted in proportion to their potential negative impact on the project success.	
5. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification (a) for her/his recommendation? (b) for the Principal Investigator(s)? **Comments:** Generally, the documentation is complete. While some COV members observed some variability in the justifications there appears to have been an increase in the completeness of the program officers' recommendations during the review period. Some program managers provide very detailed feedback to declines to compensate for minimal reviews. This trend should continue.	**YES**
6. Is the time to decision (dwell time) appropriate? **Comments:** Overall dwell rates are impressive and applicants received a decision within the six-month time period. It was noted that in some instances the time of decision to the client's intended starting date may have been only a few weeks!	**YES**
7. Additional comments on the quality and effectiveness of the program's use of merit review procedures: Merit review procedures for Phase I and Phase II appear to work well with regard to scientific and technical reviews. There is some concern among members of the COV that there needs to be additional commercial and professional breadth in the commercial review process which may be accomplished through continually striving for a wide diversity of commercial and technical reviewers. Alternatively, pre-review training of reviewers regarding the various commercialization models promoted by the SBIR/STTR could be implemented.	

Better Jacket documentation is suggested for the instances when a panel recommends "fund with revisions"in Phase II.

Finally, some jackets had no documentation of information sent to proposals that were declined. The COV suggests that the inclusion of review summaries for declined proposals is critical in assisting PIs assess the value of their project.

A.2 Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers.
Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	YES, NO, DATA NOT AVAILABLE or NOT APPLICABLE[2]
1. Have the individual reviews (either mail or panel) addressed both merit review criteria? **Comments:** In all eJfiles that , the COV reviewed, both criteria were addressed, although individual reviews differ in the amount of detail provided on each criteria. The COV recommends that NSF continue to stress the need for complete review write-ups on both merit review criteria by its reviewers. There was discussion about the definition of "broader impacts" and the recognition that commercialization in and of itself meets the requirements of broader impacts for the SBIR/STTR program – which the COV endorses. The COV recommends the addition of a third review criterion: "innovation". The SBIR/STTR program is unique in converting discovery research to commercially viable products and processes. Since innovation is prominent in the current NSF strategic plan and since innovation is the focus of IIP, the COV recommends that consideration of innovation be given a level of consideration analogous to criterion 2 -- broader impacts in proposal reviews across the Engineering Directorate as well as across the foundation.	**YES**
2. Have the panel summaries addressed both merit review criteria? **Comments:** The panel summaries address the merit review criteria better than the individual written reviews. The broad nature of the	**YES**

[2] In "Not Applicable" please explain why in the "Comments" section.

Phase I review questions tends to elicit reiteration of the project summary and not commentary on strengths and weaknesses with respect to the two merit review criteria. The Broader impacts question was often not fully addressed, especially in Phase I reviews. The more specific review questions in Phase II elicit better individual reviews which, in turn, lead to better panel summaries.	
3. Have the *review analyses* (Form 7s) addressed both merit review criteria? **Comments**: In all jackets we reviewed, both criteria were generally addressed, to a lesser or greater degree.	**YES**
4. Additional comments with respect to implementation of NSF's merit review criteria: None.	

A.3 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE [3]
1. Did the program make use of an adequate number of reviewers? **Comments**: None.	**YES**
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? **Comments:** The scientific and technical reviewers appeared to be well qualified in Phase I and Phase II. Reviewers (technical and commercial) from the private sector (small and large companies) were sometimes under represented on the panels. Commercial reviewers should include those who have demonstrated expertise in actual commercialization, which would address a COV finding that some commercial reviewers did not seem to understand the value of all of NSF's SBIR/STTR research commercialization paths (Venture Capital, Strategic Partnering, Licensing and Organic Growth [sales, profit, contracts]). This issue is a unique challenge to the SBIR/STTR program and is not a widespread problem. However, the COV suggests that pre-panel review guidance be provided to instruct the commercial reviewers on the variety and scope of commercialization models promoted by SBIR/STTR at their Grantees Conferences.	**YES**
3. Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups?[4] **Comments:** None.	**YES**
	YES

[3] If "Not Applicable" please explain why in the "Comments" section.
[4] Please note that less than 35 percent of reviewers report their demographics last fiscal year, so the data may be limited.

4. Did the program recognize and resolve conflicts of interest when appropriate? **Comments:** None.	
5. Additional comments on reviewer selection: **None.**	

A.4 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[5], OR DATA NOT AVAILABLE
1. Overall quality of the research and/or education projects supported by the program. **Comments:**	**APPROPRIATE**
2. Are awards appropriate in size and duration for the scope of the projects? **Comments**: Starting in 2006, NSF increased the Phase I award size for the STTR grants which resulted in a doubling of proposals (330) and awards (72), reflecting the more appropriate level of support for a partnership program. As the STTR grant requires a collaboration between the small business and a university partner, this activity reflects a goal of the current NSF strategic plan in promoting university-industry partnerships. The COV commends the IIP for taking the initiative to increase participation on these collaborative projects.	**APPROPRIATE**
3. Does the program portfolio have an appropriate balance of: • **Innovative/high-risk projects?[6]** **Comments:** The outcomes data suggests the innovative/high-risk balance is appropriate, as does the SBIR Phase II analysis. Both suggest a failure/ success rate fitting with taking appropriate risk.	**APPROPRIATE**
4. Does the program portfolio have an appropriate balance of: • **Multidisciplinary projects?** **Comments:** SBIR/STTR proposals seem to be driven by the intersection of opportunity and advanced research, and therefore reflects appropriate	**APPROPRIATE**

[5] If "Not Appropriate" please explain why in the "Comments" section.
[6] For examples and concepts of high risk and innovation, please see Appendix III, p. 66 of the Report of the Advisory Committee for GPRA Performance Assessment for FY 2005, available at <www.nsf.gov/about/performance/reports.jsp>.

balance. The combination of technical and commercial elements makes SBIR/STTR projects inherently multidisciplinary.	
5. Does the program portfolio have an appropriate balance of: • **Funding for centers, groups and awards to individuals?** **Comments**:	**NOT APPLICABLE**
6. Does the program portfolio have an appropriate balance of: • **Awards to new investigators?** **Comments:** Appropriate, at roughly 50%, a data point drawn from GPRA.	**APPROPRIATE**
7. Does the program portfolio have an appropriate balance of: • **Geographical distribution of Principal Investigators?** **Comments:** The geographical distribution of PIs appears appropriate based on the Phase I and Phase II award maps. However, it was noted that while EPSCoR states have a good funding rate for Phase I, they are not as competitive for Phase II awards probably reflective of a lack of infrastructure for commercialization in those state.	**APPROPRIATE**
8. Does the program portfolio have an appropriate balance of: • **Institutionnel types?** **Comments:** None.	**NOT APPLICABLE**
9. Does the program portfolio have an appropriate balance of: • **Projects that integrate research and education?** **Comments:** Although this question is not directly applicable to the SBIR/STTR program, the IIP has embraced the goals of leveraging research and education with a number of innovative supplements to its' Grantees. For example, several new programs – such as Funding for Minority-Serving Community College Research Teams (Phase IICC), Opportunity to Team with Minority Institutions (Phase IIA), Research Assistantship Supplements for High School Students (RAHSS) – demonstrate an integration of research and education. In addition, the IIP has promoted Research Experiences for Teachers (RET) and Research Experiences for Undergraduates (REU) supplements to its'	**APPROPRIATE**

Grantees to facilitate research experiences for science and math teachers (K-12) as well as undergraduate students. Further, the integration of the SBIR/STTR program into IIP provides new opportunities for the program to promote university-industry (i.e. small business) partnerships. An innovative idea is a supplement to permit SBIR/STTR Grantees to work with already existing Industry/University Cooperative Research Centers (I/UCRCs) as industrial members at a discounted rate. The COV is eager to see these university-small business relationships grow and expand under the reorganized IIP.	
10. Does the program portfolio have an appropriate balance: • **Across disciplines and sub-disciplines of the activity and of emerging opportunities?** **Comments**: According to SBIR/STTR Program data, the allocation of funding to emerging opportunities seems sufficient, as its funding rate is at least as strong as NSF's overall efforts. Funding across disciplines is both balanced and reflective of actual market demands. (Electronics is 1st, Biotech is 2nd while Manufacturing Innovation and Security Technology are 6th and 7th respectively). The multidisciplinary nature of projects is indicated by the topics, e.g. bioinformatics covers Biotech and Information Technology, while Electronics may cover materials and manufacturing as well. The program staff does a good job aligning proposals under the research topics and ensuring that multidisciplinary proposals find an appropriate home.	**APPROPRIATE**
11. Does the program portfolio have appropriate participation of underrepresented groups? **Comments:** The COV noted that women PIs were funded at similar and sometimes higher rates than men across all racial/ethnic groups in the aggregate! Hispanic women were not as well represented, although it is not clear if this is simply a reflection on the number of submissions by Hispanics.	**APPROPRIATE**
12. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. **Comments:** The SBIR/STTR program was responsive to the executive order (number 13329) to stimulate innovation in manufacturing with a special topic addressing the goals and objectives of the manufacturing innovation initiative.	**APPROPRIATE**

Additionally, the program was responsive to national priorities pertaining to energy with a special energy challenge topic under advanced manufacturing. The SBIR/STTR Program conducts “topic-selection/prioritization” workshops that include researchers, industry leaders, and financiers. These workshops are an effective means of insuring that proposal topics remain relevant and aligned with the commercial marketplace.	
13. Additional comments on the quality of the projects or the balance of the portfolio: None.	

A.5 Management of the program under review. Please comment on:

1. Management of the program.
Comments: The NSF SBIR/STTR program appears well managed and willing to address problems in an innovative way with concrete steps and actions. The COV is impressed with the dedication, expertise and qualifications of the program management staff. The SBIR/STTR Office has been very responsive to the Advisory Committee and the previous COV. The Program's Managers have been able to adjust to a large proposal volume, incorporating use of technology (e.g. Fastlane) and consultants to better manage the process and improve efficiency. Managing the substantial number of applications, panelists, and awards, and executing receipt and award of proposals within less than six months is commendable. Creative solutions to challenges such as the inclusion of commercial reviewers through the Emerging Opportunity pilot, in Phase I, are worth special note. This has been accomplished in spite of limitations on travel which adversely impact the Program Officers. The slight decrease in dwell times seems to correlate with distractions due to the reorganization of the SBIR/STTR Office into IIP as well as staff turnover. That being noted, the dwell times are still at commendable levels.

While the COV recognizes that high staff turnover can lead to efficiency disruptions, there are also benefits from new staff (new perspectives, new process ideas, new contacts for review panels, etc.) Even so, the workload still seems too high. The COV believes that standard procedures should be quickly instituted to train new Program Officers. At the same time, these standardized procedures should be balanced by allowing Program Officer flexibility to engage their unique skills. So the challenge to the management is to find ways to be more productive with limited resources. We commend the SBIR/STTR Program staff for their good internal communications, teamwork and collegiality.

The SBIR/STTR Program staff should do more to assemble and use data for management and evaluation purposes. We urge them to use the best information technology tools to greatly improve their ability to log and retrieve data for process improvement and program evaluation.

The program objectives are well developed and relate well to the strategic plan of NSF. The SBIR/STTR program is unique within the NSF, supporting research and innovation that provides societal benefits. Based on the high quality of proposals funded, companies have built core strategies based on their SBIR project results and their success in the market place supports US research, product and process leadership across the globe.

2. Responsiveness of the program to emerging research and education opportunities.
Comments: See also A.5.1
The companies that have been funded in Phase I and Phase II are performing cutting edge research, filling important technical and market gaps as well as creating new market

opportunities in a fast changing technological and societal landscape. The new Emerging Opportunities Pilot Program is an important innovation within the Program and it invokes both internal expertise, and external expertise that is available in the Program's network.

As noted earlier, the program has been very responsive through special initiatives in manufacturing, energy, security and emerging opportunities.

As stated previously, the IIP has embraced the goals of leveraging research and education with a number of innovative supplements to its' Grantees. For example, several new programs – such as Phase IICC, MSCC, Phase IIA, and RAHSS – demonstrate an integration of research and education. In addition, the IIP has promoted RET and REU supplements to its' Grantees to facilitate research experiences for science and math teachers (K-12) as well as undergraduate students. Further, the integration of the SBIR/STTR program into IIP provides new opportunities for the program to promote university-industry (i.e. small business) partnerships. An innovative idea is a supplement to permit SBIR/STTR Grantees to work with already existing I/UCRCs as industrial members at a discounted rate. The COV is eager to see these university-small business relationships grow and expand under the reorganized IIP.

3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

Comments:

The program's planning and prioritization process, both internal and external, is appropriate. It is successful in ensuring the appropriate balance of high risk and multidisciplinary research with commercial viability. The SBIR/STTR Program's "topic-selection/prioritization" workshops that include researchers, industry leaders, and financiers are an effective means of insuring that proposal topics remain relevant and aligned with the commercial marketplace.

4. Additional comments on program management:

The processes in place from solicitation, review management, award management, feedback, report tracking, communication, to Phase III follow-up on project results and company future activity provide the backbone for good program management.

The COV endorses the topic selection/prioritization workshops and recommends that they be utilized on a more formal basis and include a follow-up evaluation process which builds institutional memory.

The Commercialization Follow-up process is good as a baseline that needs to be built upon on a consistent basis.

Visits to grantees (portfolio management) should be a very important part of the program but have not been to date due to serious limitations on travel resources. The COV urges NSF to explore ways to increase travel budgets, especially to Phase II and Phase IIB Grantees.

The 2004 COV recommended that the SBIR/STTR Program discontinue putting it resources into the National SBIR Conference and use those freed up resources to improve the agency's SBIR/STTR management process. The SBIR/STTR embraced this recommendation and discontinued subsidizing the National Conferences. This COV endorses this decision and sees no adverse impacts due to the SBIR/STTR Program's decision.

PART B. RESULTS OF NSF INVESTMENTS

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- To promote the progress of science.
- To advance national health, prosperity, and welfare.
- To secure the national defense.
- And for other purposes.

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 <u>OUTCOME GOAL for PEOPLE</u>: Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens."

The SBIR/STTR program has a long record of support for diversity, competitiveness, global engagement and education of the scientific, engineering and technical workforce. This program, relative to other NSF programs, has the unique benefit of providing a broad set of small business commercial employment opportunities to talented individuals. In fact, as indicated in the recent science indicators published by the NSF, small businesses employ more scientists and engineers than either universities or large businesses. Recent surveys show that SBIR/STTR-funded companies have 50% increase in employment in the eight years following completion of their funded projects.

Comments on the support for diversity:

- During the past few years NSF has made a concerted effort to expand the diversity of the workforce and educational partners engaged with the SBIR/STTR program. Examples of this include their funding of the *Small Business Minority Academic Research Partnership Supplement*, *Research Assistantships for High School Students*, *Supplemental Funding for Diversity Collaborations, Research Experiences for Teachers, Research Experience for Undergraduates*, and *Supplemental Funding for Minority-Serving Community College Research Teams*. All of these opportunities expand educational research opportunities for underrepresented groups within the context of small business innovation and commercialization partnerships. The SBIR/STTR program is commended for actively embracing these programs and promoting participation by their small business grantees.

Comments on the support for competitiveness:

- The proposal preparation, panel review and commercialization consultant aspects of the SBIR/STTR Program help many engineer/scientist PIs understand the need for thinking and acting competitively and broadly for the first time.
- In order to be competitive, the program needs to continue to be active in encouraging a team approach to the research-production-marketing-financing aspects of technological innovation. In a number of projects, engineers and scientists were attempting to run a business without the requisite experience or recognition of the need for a larger team. The SBIR/STTR program does a credible job of addressing these issues at their grantees conferences with opportunities for training in several crucial business/innovation/partnership related areas. These include
    1) intellectual property matters,
    2) venture capital commercialization models,
    3) strategic partnership commercialization models, and
    4) licensing commercialization models.
- In addition, the SBIR/STTR program is collaborating with the Kaufman Foundation in its upcoming 2007 Grantees conference. This collaboration could lead to mutually beneficial efforts regarding entrepreneurial training using the Kaufman “FastTrac® TechVenture™ Program”” and/or “Planning the Entrepreneurial Venture (PEV)” curriculum.

Comments on the support for global engagement:

- A Phase I Award 0232345 and a follow-on Phase II Award 0349464 were made to TradingCube, Inc. to develop web-based tools for international trade. This program is an example of SBIR/STTR engagement with developing a globally engaged

workforce, by seeding development of a widely useable tool to help U.S. organizations more quickly investigate international opportunities.

Comments of the support for education:

- According to recent telephone follow-up interviews with past grantees, over 1/3 of successfully commercialized projects funded by the SBIR/STTR program during the reporting period had strong academic collaboration. A significant number of the technologies, which were the focus of these projects directly originated from graduate theses. This finding is important in that it indicates the SBIR/STTR program is playing an important role in catalyzing mutually beneficial relationships between industry and academia that are critical to future workforce development, economic prosperity and national health.

B.2 OUTCOME GOAL for IDEAS: Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society."

The outcome goal for ideas, in the COV's assessment, is well served by the SBIR/STTR Program at NSF. The COV feels that the SBIR/STTR programs play an important role for the Engineering Directorate, the NSF as a whole and the nation in pushing the progress of science and engineering by linking discovery research with small entrepreneurial enterprises for innovation. Such innovation is expressed by the introduction of new products and processes, developing and employing new talent, and otherwise turning intellectual merit into societal benefit through new and expanding discovery-driven enterprises throughout the country. The SBIR/STTR program has a unique role within NSF in turning discovery research into innovation with its focus on technology commercialization. The COV finds that the internal program management and the external supporters of the program are well qualified to insure that funding is directed at grantees in a manner that does indeed serve the program's commercialization outcome goal for ideas. This commercialization focus is emphasized by the Phase IIB supplement, which provides additional funds to grantees with third party partnerships. The COV endorses this highly successful and innovative supplement. Our analysis shows that the private leverage in Phase IIB is growing, substantially.

Over the time period covered by the COV review there is evidence that NSF SBIR/STTR is funding ideas and promoting innovation and partnerships by linking grantees to universities and strategic partners through the SBIR and STTR programs. An increasing fraction (i.e. 38%) of SBIR/STTR awards had university participation and collaboration, aligned with an important goal of the NSF strategic plan to promote industry university partnerships. In addition, a substantial and increasing fraction of Phase IIB supplement SBIR/STTR grantees received monies from venture capitalists, angels and strategic partners. In addition, Phase IIB support is coming from State and federal governmental sources.

Historically the U.S. research base has been stronger than other nations. Now it is even more crucial to continue world leadership in idea development, but to also accelerate conversion of this diverse and rich research knowledge base to useful products, processes and services that will ensure our continued innovation, global leadership and economic

prosperity. The last two decades of research are now "converging," in areas such as biosciences, medical informatics, electromechanical (micro/nano) product opportunities, information sciences enabled infrastructures for supporting services, higher performance computation driven algorithms helping businesses, advanced materials and manufacturing processes for everything from ships to computer chips and so on. The management of the SBIR/STTR program has encouraged multi-disciplinary topics, funding, and collaboration by its Emerging Opportunities program, its topic areas and in its review systems for topic identification and prioritization. Several of the focal areas of NSF SBIR/STTR transcend these converging technologies with a research foundation that is strong. They include biochips, drug delivery, sensors and diagnostics, instrumentation, simulations, wireless applications, manufacturing innovation, education software and others. The STTR/SBIR Program has processes to enable increased program manager interaction to manage such multi-disciplinary technology companies. These convergent areas create immense SBIR opportunities that have market transforming and future implications.

The COV finds that the SBIR/STTR Program provides an appropriate way for user inspired research and development to be turned into innovation through new and existing small enterprises throughout the country. As many studies document, it's the small enterprise sector that increasingly offers opportunities to maintain the U.S. competitive advantage and talent pool. In a period of increasing interest in "open innovation" by large enterprises, the SBIR/STTR grantees and their work on innovative technologies offers a way for strategic alliances between small and large firms to collaborate in addressing market opportunities which neither entity alone could address. As large companies continue to implement open innovation models, the role of the SBIR/STTR Program and its stability will continue to be critical to the national health, prosperity and welfare in the coming decades. In this partnership model, the inclusion of Partnership for Innovation (PFI) , Industry University Cooperative Research Center, (I/UCRCs), SBIR/STTR, and Grant Opportunities for Academic Liaison with Industry (GOALI) in the recently formed IIP reorganization is a very appropriate and proactive positioning within NSF for addressing technological innovation.
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The SBIR/STTR has implemented a valuable performance assessment tool to monitor the program. The COV endorses the performance tracking of SBIR/STTR grantees, even after completion of the award. Recent telephone surveys of past Phase II SBIR/STTR recipients demonstrate the impacts the focus on technology commercialization and innovation are having.

- DHARMACON (9801382), a past recipient of NSF SBIR/STTR awards, was founded in 1995 by a recent graduate of the University of Colorado. Its product was based on a Ph.D. thesis and its Phase II award focused on new RNA synthetic chemistry leading to work in RNA interference. The firm was purchased by Fisher Scientific in 2004 for a considerable sum, reportedly in the 10s of millions, and now employs 150 employees within Fisher. The SBIR/STTR grant contributed to turning ideas in functional genomics and drug discovery into innovation which led to a strategic acquisition by a larger firm.
- NeoGen (0110472), a recipient of NSF SBIR/STTR awards, was formed by two inventors in conjunction with the University of Arizona, taking advantage of its facilities and students. The firm's approach involved new ideas for the rapid isolation and screening of plant and mammalian RNA. The firm sold the technology to Hi-

Thruput Genomics of Tucson for several million in royalties out of future sales. Assuming the royalty rate of 3 to 5%, the economic impact of the licensed technology was 20 to 33 times the royalties received. The inventors have now turned to developing new applications and pursuing additional innovations.

- IntelliChem (0110478) received awards from the NSF SBIR/STTR program to develop synthetic chemical software. The company has been successfully acquired by a major investor with successful previous major technology success stories, providing additional sources of capital to build critical mass in its work around synthetic notebooks.

These convergent areas create immense SBIR/STTR opportunities that have market transforming and future implications. Hence the COV suggests that SBIR/STTR program will continue to play an increasingly critical role in the nation's economy in the coming decades.

B.3 <u>OUTCOME GOAL for TOOLS:</u> Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation."

Although the SBIR/STTR program does not impact tools in the traditional sense at the NSF, the SBIR/STTR program provides broadly accessible, state-of-the-art S&E facilites and tools in several ways. First, the program provides an innovative segment of society (i.e., high performance entrepreneurs) with funding for technology development and innovation. Second, the program encourages collaborations between research universities, federal laboratories and high performance entrepreneurs. Specifically, the outcome goal for tools is supported by the program owing to the direction of funding towards university faculty that contributes to the intellectual property and technological resources available to faculty and entrepreneurs alike within the university's ecosystem. Third, the program encourages entrepreneurs to participate in other NSF initiatives (I/UCRC, PFI, GOALI). A recent supplement provides partial support for small business SBIR/STTR Grantees to join I/UCRCs as fully participating members. Lastly, the program is uniquely positioned to leverage societal benefits with its robust commercialization and innovation emphasis.

<u>Examples</u>:

- **Discovery**
  - Vivisimo (0131966) – Facilitates discovery and learning over the internet by clustering information and building query specific taxonomies in real time.
  - Weaver Language, Inc. (0239290) - Machine translation software for automation of human language translation. This product facilitates discovery and learning by statistically constructing cryptographic translation libraries based on large document repositories.

- **Learning**
  - ADA Technologies (9710948) – Software simulation used with high school biology texts.
  - Learning Technologies (0321598) - Digital, low cost planetarium for high schools and small science centers.

- **Innovation**
  - SurFx (0239331)– Low temperature atmospheric plasma tools for solvent free cleaning, promoting adhesion between dissimilar materials, depositions and sterilization.
  - Alpha Manufacturing, Inc. (0091520) – In collaboration with the University of South Carolina, developed a three dimensional image correlation system that simultaneously measures surface shape, displacement and strain.

B.4 OUTCOME GOAL for ORGANIZATIONAL EXCELLENCE: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices."[7]

Unique to the NSF, SBIR/STTR Program Officers have business/commercialization backgrounds in addition to their technical background. Specifically, several SBIR/STTR Program Officers possess prior venture/investment backgrounds while others were representatives of the Industrial Research Institute for their corporate employers. Still others have experience at large, small, and start-up companies . This unique mix of SBIR/STTR Program Officers is the key to the organization excellence of the SBIR/STTR program. In addition, this program officer mix is an important resource that can be used throughout the Division of Industrial Innovation and Partnerships (IIP), the Engineering Directorate and the foundation as a whole. In addition, the reorganization of the SBIR/STTR program into the IIP with other programs aligned with an innovation focus such as, I/UCRC, GOALI, and PFI, is endorsed. The COV commends the staff of IIP for embracing the reorganization and promoting synergistic opportunities among the division as well as engineering as a whole.

STATE OF THE ART BUSINESS PRACTICE :

- The SBIR/STTR Program practices continual improvement and innovation itself in the form of periodic program reviews by outside experts that lead to programmatic changes that increase the program's responsiveness and effectiveness. Several examples include the change in size of the Phase I STTR award from $100,000 to $150,000 to encourage small business and university partnerships as well as the recently announced supplement to encourage small business membership in I/UCRCs.
- The SBIR/STTR has improved its monitoring of program impact and effectiveness by

[7] For examples and further detail on the Organizational Excellence Goal, please refer to pp. 19-21 of NSF's Strategic Plan, FY 2003-2008, at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>. Please note that there will be a new Strategic Plan in FY 2007.

telephone follow-up and interviews with past grantees. This data, albeit not fully analyzed, is already providing indications on how to further improve the program and can ultimately be the nucleus of a federal government-wide 'best practice' regarding commercialization activities within the SBIR/STTR Program. The COV recommends continuation of the follow-on interviews and the addition of more data reduction and analysis. Further, the COV recommends the allocation of resources for said activities.

- The COV commends the SBIR/STTR Program for the use of technology (eJacket, Groove communication) to manage its large portfolio of projects and proposals.
- The COV recognizes that significant staff turnover is part of the NSF culture and brings new ideas and energy into the SBIR/STTR program. The COV also recommends that the SBIR/STTR program implement processes and procedures to capture and maintain institutional knowledge.
- The COV recommends that the program officers within SBIR/STTR maintain cross sector communication to continue to look for 'traditional' multidisciplinary opportunities. Commercialization itself is a multidisciplinary activity and this SBIR/STTR program emphasis is unique within the foundation.

AGILE RESPONSE TO CHANGING TECHNOLOGY LANDSCAPE:

- The SBIR/STTR Program conducts "topic-selection/prioritization" workshops that include researchers, industry leaders, and financiers. These workshops are an effective means of insuring that proposal topics remain relevant and aligned with the commercial marketplace.
- The SBIR/STTR Program at NSF was the first agency to respond to the President's Executive Order No. 13329 'Encouraging Innovation in Manufacturing' with a special solicitation topic to support manufacturing innovation.
- Emerging Opportunities solicitations show innovative, timely selection of new topics to address areas and opportunities of high interest. In addition, SBIR/STTR program managers handle phone calls to help prospective companies assess the appropriateness of the funding opportunity.
- The COV commends the SBIR/STTR program for providing 98% of proposals with an award/decline decision within 6 months of submittal, far surpassing the set target of 70%.

INNOVATIVE PRACTICES IMPROVE AWARD QUALITY AND BRING INCREASED SUCCESS :

- Based on the previous 2004 COV report, the SBIR/STTR program has instituted a mechanism to receive additional information from innovative proposals with borderline reviews to increase the quality of awards and opportunities for commercial and societal impact.
- SBIR/STTR grantee workshops include introduction to funding partners, both investor and strategic partner, to improve success of the awardees.
- Grantee conferences include topical presentations and training in commercialization related areas such as developing and presenting a business plan, intellectual property and patent licensing, as well as investors' perspectives and strategic partner perspectives.

- The SBIR/STTR program has instituted a special supplement (Phase IB) to address the funding gap between Phase I award completion and Phase II initiation.
- The SBIR/STTR program has instituted a special supplement (Phase IIB) to support additional research towards commercialization goals. The supplement is matched $2 for every $1 supplement, with the matching monies supporting critical commercialization activities such as marketing. The Phase IIB supplements are matched by strategic partners and venture investors as well as non-SBIR/STTR federal and state sources. During the years covered by this COV report (2004, 2005, 2006), the Phase IIB funding has increased from $10 million, to $43 million, to $57 million. Venture capital funding significantly increased as a proportion of outside funding from 4% to 5% to 29% and strategic partner funding ranged from 39% to 18% to 19%.
- The COV recommends that more resources be allocated to program managers for portfolio management of their respective grantees.

Overall, the COV commends the SBIR/STTR program for practicing what it preaches by demonstrating an agile, nimble entrepreneurial organization within a larger governmental agency.

Part C: Other Topics:

C. 1. Program Areas in Need of Improvement or Gaps within Program Areas

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.

C. 2. Program's Performance in Meeting Program Specific Goals and Objectives

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: (l) 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.

C. 3. Agency-wide Issues to Be Addressed by NSF to help improve the Program's Performance

None.

C. 4. Other Issues the COV Feels are Relevant

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.

C. 5. Improvements to the COV Review Process, Format and Report Template

The use of eJacket in the current COV was a vast improvement and permitted time for substantive analyses and discussion. In addition, the use of the electronic workspace was an improvement.

For future COVs, a common electronic workspace for data and proposal electronic files needs to be developed, if the issues surrounding the confidential nature of the eJacket can be addressed.

For the next COV, the program should provide, organize and present graphical and summary data (numbers and percent) on reviewers, panels, applicants and awardees that relate to the questions in section A of the review process.

Early orientation on the COV process and the continued use of the COV tools via teleconference would be very valuable for future COV members.

COV Member Biographical Sketches

January 2007

Albert Johnson

Albert Johnson is a senior analyst in the Science & Technology Division, Corning Incorporated. He manages research contracts, consortia and other affiliations for Corning's research organization, conducts and coordinates Six Sigma projects in the research organization, and participates in business analysis for strategic planning. Before joining Corning, Mr. Johnson was a Member of Technical Staff of the Software Engineering Institute in Pittsburgh Pennsylvania. There he provided consulting, training and guidance to senior military program managers and industrial software organizations and was head program administrator for the Education Program.

Mr. Johnson has a M.S. in industrial administration and a B.S. in management science from Carnegie Mellon University, a certificate in management of research, development, and technology-based innovation from the Massachusetts Institute of Technology, and has completed the Advanced Licensing Institute of the Franklin Pierce Law Center. He is on the Board of Directors of the Industrial Research Institute, and is past chairman of its Research on Research Committee. Johnson also participates on government and academic advisory councils. Mr. Johnson is an African American.

E. Jennings Taylor

Dr. Taylor received his B.A. (Chemistry) from Wittenberg University in 1976 and his M.S. and Ph.D. degrees in Materials Science from the University of Virginia in 1978 and 1980, respectively. Dr. Taylor also completed a Master's program in Technology Strategy and Policy at Boston University with the M.A. degree awarded in 1991. Dr. Taylor's dissertation research was completed during an 18 month stay at Brookhaven National Laboratory in the area of electrochemical kinetics. Dr. Taylor founded Faraday Technology Inc in 1991.

Dr. Taylor, Faraday's Chief Executive and Intellectual Property Officer, leads Faraday's business strategy, coordinating the alignment of the investment, intellectual property, and technology strategies. In addition to technical degrees and an expansive career in technology management prior to founding Faraday, is a licensed Patent Agent and represents Faraday on patent matters before the USPTO. In addition, Dr. Taylor has been honored with several business and personal achievement awards during his tenure with Faraday, most recently for Outstanding Professional Achievement as a technology leader by the Affiliate Societies Council of the Engineering and Science Foundation of Dayton and as an Entrepreneur of the Year finalist by Ernst & Young. Dr. Taylor has published over 120 technical publications and holds 25 U.S. Patents with additional patents pending.

Walter H. Plosila

Dr. Plosila is Vice President, Technology Partnership Practice, for Battelle Memorial Institute. The Technology Partnership Practice has worked with a number of universities, regional business organizations as well as states, in the development and design of technology, biotech/life sciences and information technology strategies as well as such areas as research park conceptualization, research core competencies, cluster analysis, successful program design and implementation.

Previously, Dr. Plosila served as Executive Director of the North Carolina Alliance for Competitive Technologies, the President of the Suburban Maryland Technology Council (now Technology Council of Maryland) and as Deputy Secretary of the Pennsylvania Department of Commerce and Director of the Pennsylvania Governor's Office of Policy and Planning. He was responsible for the establishment of the Ben Franklin Partnership Programs in Pennsylvania that includes seed capital, incubators, networks, and business-higher education partnerships.

COV Member Biographical Sketches

January 2007

Walter H. Plosila (cont.)

Dr. Plosila has a Ph.D. from the University of Pittsburgh, an MA from Pennsylvania State University; and a BA from Beloit College (Wisconsin). He has served as an adjunct faculty member at five universities; most recently The Johns Hopkins University and Carnegie-Mellon University and has published numerous papers and articles in the areas of economic and technology development, entrepreneurship, and strategic management.

Dr. Plosila is past chair of the NSF SBIR External Advisory Committee. He has also received the Founders' Award from the National Small Business Incubator Association and the Tibbetts Award from the U.S. Small Business Administration.

Krisztina Holly

Krisztina Holly is founding executive director of the University of Southern California Stevens Institute for Technology Commercialization (USC Stevens). Reporting directly to the provost, she oversees a highly qualified growing professional staff with expertise spanning the business, marketing, financial, and legal implications of intellectual property management, technology licensing, and new venture creation.

Ms. Holly earned B.S. and M.S. degrees in mechanical engineering from MIT, with a focus on optics and product design. Her career as an innovator began during her undergraduate years, when she worked on a team that developed the world's first computer-generated, full-color reflection hologram at the MIT Media Lab. Soon afterwards, she designed a robotic weld-seam-tracking program for the NASA space shuttle's main engine and co-designed and built a head-eye robot used for vision research. In 1991, she and two teammates invented and patented "The Stylus", a pre-Web electronic shopping tool, and wrote a business plan for it that won MIT's campus-wide entrepreneurial competition. The resulting company, Stylus Innovation, created a new development tool called Visual Voice that revolutionized the computer telephony industry. Stylus was acquired in 1996 by Artisoft, Inc.

John Pyrovolakis

Dr. Pyrovolakis is the founder and CEO of iKaptivate, an online form management and workflow startup based out of New York City.

Dr. Pyrovolakis earned a triple major at New York University in math, computer science, and philosophy. He then went to MIT for his doctorate in Linguistics & Philosophy, with a concentration in mathematical logic. Dr. Pyrovolakis spent a year in the Artificial Intelligence Laboratory working with the ONTIC group, which focused on automated theorem proving. He was also a teaching fellow at Harvard College, where he earned the Derek Bok prize for teaching excellence.

In 1996, Dr. Pyrovolakis founded Collegescape.com – an online college admissions service - out of the MIT $50K entrepreneurship competition. He sold Collegescape to the Thomson Corporation (NYSE: "TOC") in 1998, where he stayed until 2000. Since then, he has done consulting work for the U.S. Department of Education, MasterCard International, United Health Care, SunTrust Bank, and Jesup & Lamont Securities. The work has been primarily in connection with technology audits and due diligence on potential corporate venture and strategic investments and internet strategy.

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Meg Wilson

Meg Wilson teaches in the Innovation Creativity and Capital (IC2) Executive M.S. Program in Science and Technology Commercialization at the University of Texas at Austin (UTAustin). She also serves on NSF's SBIR Advisory Board and works on special IC2 projects. Ms. Wilson was MCC's Vice President for Business Development and was Coordinator of the Center for Technology Development and Transfer, College of Engineering, UTAustin where she was responsible for commercializing university research. She also served as Governor White's Science and Technology Coordinator; a manager for Governor Clements' Texas 2000 Long Range Planning Project; and a policy analyst for the Texas General Land Office Coastal Management Program.

Ms. Wilson has a Masters from the Lyndon B. Johnson School of Public Affairs and a BA in Politics from Ithaca College. She is Immediate Past President of the Technology Transfer Society, President of the Weavers and Spinners Society of Austin, a member of the Camino Real Export Council, on the Advisory Board for Girlstart and on the Board of Tekstrategy Ltd., UK.

Mark H. Clevey

Mark H. Clevey is a nationally recognized specialist in cutting-edge entrepreneurial business development. He is a veteran of the U.S. Air Force and a Western Michigan University Honors College Graduate where he received two academic scholarships. He holds a Masters Degree in Public Administration (MPA), with emphasis in new industry development and public-private partnerships. He also holds an Advanced Business Counselor Certification from the Michigan Small Business Development Center Network (MI-SBDC). He is a member of Kappa Delta Pi (Honors Society in Education) and has extensive experience in corporate training. He has also been an Adjunct College Instructor in Renewable Energy and American Government and lectured extensively in Entrepreneur Development.

Mr. Clevey has worked in both the public and private sectors and has over 30 years of experience in cutting-edge business development. Currently he is the Vice President, Entrepreneurial Development with the Small Business Association of Michigan (SBAM). In this capacity, Mark also serves as the Executive Director for the Small Business Foundation of Michigan (SBFM). SBAM is dedicated to fostering and Entrepreneurial Economy in the state, characterized by the robust creation, retention, expansion, and attraction of entrepreneurial small businesses. SBFM funds research and demonstration projects designed to investigate the NEXUS between Entrepreneurship and other economic drivers (e.g., education, etc.). During this period, Mark has received five awards and recognitions for his work:

Brent E. Stucker

Dr. Stucker joined the Mechanical & Aerospace Engineering Department at Utah State University in 2002. Prior to coming to USU, Dr. Stucker was an Assistant Professor of Industrial & Manufacturing Engineering at the University of Rhode Island and the founder and director of the Rapid Manufacturing Center (an Industry/University collaborative research organization). While at URI he received the 2000 University of Rhode Island Outstanding Research award and the 2001 Albert E. Carlotti Faculty Excellence Award for his research in Rapid Manufacturing. Since coming to USU, he has focused his research efforts on advanced manufacturing techniques and their applications, with particular focus on new materials development for biomedical implants and aerospace/satellite structures.

Dr. Stucker holds several patents, has authored dozens of articles, presented more than 50 talks at conferences around the world, and has performed more than $2,000,000 of sponsored research in the areas of rapid prototyping, manufacturing, and materials science. He received his Ph.D. from Texas A&M University in 1997 and his B.S. from the University of Idaho in 1993, both in Mechanical Engineering.

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Karthik Ramani

Dr. Ramani is a Professor in the School of Mechanical Engineering at Purdue University. He earned his B.Tech from the Indian Institute of Technology, Madras, in 1985, an MS from The Ohio State University, in 1987, and a Ph.D. from Stanford University in 1991, all in Mechanical Engineering. He has been the recipient of numerous awards including Purdue University's University Faculty Scholars Award in 2002, the Discovery in Mechanical Engineering Award for his work in shape search in 2005 and the innovation of the year award (finalist) from the State of Indiana in 2006.

Dr. Ramani founded the Purdue Research and Education Center for Information Sciences in Engineering (PRECISE) and also serves as the chief scientist at Imaginestics, a knowledge-based software company that has launched the worlds first on-line search engine for the engineering industry. He currently holds 7 patents and 5 more are pending.

Dr. Ramani serves in the editorial board of Elsevier Journal of Computer-Aided Design and Chairs ASME Computers and Information in Engineering (CIE) Internet-Aided Design, Manufacturing and Commerce Committee. His current research interests include geometric computation, shape design and analysis, configuration, constraint representation and solving, and physics as applied to early design.

Janet Yancey-Wrona

Dr. Yancey-Wrona recently joined AIKO Pharmaceuticals in Freeport, ME. as Chief Operating Officer. Previously she was the Science Advisor and Director, Office of Innovation Office within the State's Department of Economic and Community Development that advises the Governor and promotes, evaluates and supports research and development relevant to the State, including: technology transfer, new technology application, new product development, and sustained, inter-institutional, multidisciplinary efforts.

Dr. Yancey-Wrona earned her Ph.D. in Biology from the University of North Carolina and spent five years at the National Institutes of Health (NIH). Prior to joining state government she was a research scientist at Indexx Laboratories, Inc. in Westbrook, ME.

Dr. Yancey-Wrona provided guidance to the Governor and Commissioner on initiatives, issues, and funding related to science, engineering, and technology. She oversaw programs designed to increase Maine's research, development, and commercialization capacity. She developed and prioritized state R&D strategies and focus areas, coordinated cooperative efforts among government, the private sector, universities and colleges, developed and implemented the State Science and Technology Action Plan, managed and reported results from a Comprehensive Research and Development Evaluation and Report Card, served as State Director for the Experimental Program to Stimulate Competitive Research (EPSCoR), and organized and directed the Maine Science and Technology Advisory Board.

Angus Livingstone

Angus Livingstone is Managing Director of the University-Industry Liaison Office (UILO) at the University of British Columbia (UBC), and is President of the University's wholly owned subsidiary, UBC Research Enterprises Incorporated.

Mr. Livingstone serves on numerous boards including the Alliance for Commercialization of Canadian Technologies, UBC Research Enterprises, Inc., Vancouver Coastal Health Research Trust, Aggregate Therapeutics Inc. and Webnames.CA, Inc.

COV Member Biographical Sketches

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Angus Livingstone (cont.)

He is co-founder and Chair of the Alliance for the Commercialization of Canadian Technology and is currently a member of the Association of University Technology Managers and the Licensing Executive Society.

Mr. Livingstone graduated from UBC with a B.Sc. in Computer Science in 1983. In 1988, he joined the UILO where he has held various positions relating to industry sponsored research, technology transfer, and the management of UILO operations. The UILO conducts the technology transfer and commercialization activities at UBC. UILO's record in securing U.S. patents is unrivalled by any other Canadian university. UBC currently has over 200 licenses with companies around the world and has actively supported the creation of 120 spin-off companies.

TO: Richard Buckius, AD/ENG

FROM: Kesh Narayanan, DD Industrial Innovation and partnerships (IIP)

DATE: September 12, 2007

SUBJECT: Report on Diversity, Independence, Balance, and Resolution of Conflicts for the IIP COV

This is my report to you on the diversity, independence, balance, and resolution of conflicts of the Committee of Visitors (COV) for IIP held January 23-26, 2007.

The COV, which was assembled to review the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) programs, and whose report was presented to the Engineering Advisory Committee on April 20, 2007, consisted of ten persons, of whom eight are male and two are female. One of the members of the committee is African-American.

Three of the COV members are from academia and seven were from the business community. The Chair of the COV is a material scientist, chief executive of a small business and a member of the Engineering Advisory Committee The members represent the relevant areas to the SBIR /STTR including academia, the investment community, small business, large business, technology transfer, and business development. All the invited COV members attended the meeting.

Eight COV members have neither been applicants to SBIR/STTR in the past five years nor served as ENG Advisory Committee members. Most COV members are familiar with SBIR/STTR from having served on the ENG Advisory Committee, the SBIR/STTR Advisory Committee, review panels, or are former or current grantees. None had proposals pending with SBIR/STTR during the COV meeting. A conflict of interest briefing was held on the first day of the COV meeting. All COV members were required to complete the NSF Conflict of Interest form. All members of the COV were barred from seeing proposals from their home organizations and no specific conflicts occurred with any of the proposals that the COV considered during the meeting.