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Statement Submitted for the Record by

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before the

Subcommittee on Technology and Innovation
Committee on Science and Technology
United States House of Representatives

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to submit a statement for the record to discuss NASA's Small Business Innovation Research (SBIR) Program and the Small Business Technology Transfer (STTR) Program. The SBIR/STTR programs are managed by the Innovation Partnerships Program Office (IPPO) whose primary mission is to provide leveraged technology and capabilities to NASA programs and projects through partnerships with industry, academia, government agencies, and national laboratories.

The SBIR/STTR programs provide an opportunity for small, high technology companies and research institutions to participate in government sponsored research and development efforts on key technology needs. Below, I have addressed the six issues posed by this Subcommittee: program effectiveness, award level, small business participation, financing and commercialization, administrative cost and venture capital.

Program Effectiveness

Many technologies funded by SBIR/STTR have made important contributions to NASA programs and projects, and many have also been commercial successes that are bringing important benefits to society. The agency is actively working to increase the number of NASA-funded SBIR/STTR technologies with applicability and adequate maturity for use in NASA's missions and projects.

Some examples of SBIR/STTR technologies that are making important contributions to some of NASA's programs and projects are provided below:

- NASA's Mars Exploration Rovers are using SBIR technologies including lithium

ion batteries from Yardney Technical Products of Pawtucket, Connecticut, heat switches from Starsys Research of Boulder, Colorado, and ASCII chips from Maxwell Technologies of San Diego, California.

- Space Shuttle return-to-flight after the Columbia accident used SBIR-developed wireless sensors from Invocon of Cunroe, Texas, for the impact detection system in the wing leading edge of the Shuttle. These wireless sensors are also used for vehicle health monitoring and microgravity instrumentation on the International Space Station.
- The Cassini-Huygens Mission now at Saturn used several SBIR technologies including a helium magnetometer from Polatomic of Richardson, Texas, a coilable boom to deploy the magnetometer from AEC-Able of Goleta, California, and filters for several instruments on the spacecraft from Barr Associates of Westford, Massachusetts.
- The Hubble Space Telescope is using a miniature, high speed, vibration free turboalternator from Creare of Hanover, New Hampshire.
- The heat shield on the return capsule for the Stardust mission – first ever sample return from a comet, and fastest ever Earth entry at 12.9 Km/sec – was enabled by an SBIR with Fiber Materials Incorporated (FMI) of Biddleford, Maine. FMI scaled up the heatshield fabrication technology for Phenolic Impregnated Carbon Ablator (PICA) from ~0.1m maximum size at the time, to the ~1.0m size needed for Stardust.

A few examples of successful commercialization of SBIR/STTR technologies are provided below, and from the breadth of examples it is evident that SBIR/STTR program technologies have potential application in every key industrial sector:

- An STTR contract from NASA's Langley Research Center led to application of ultra-precise GPS for tractor-steering systems. Developed by Novariant Corporation of Menlo Park, California, these systems are in use around the world increasing crop yields, reducing chemical use and conserving irrigation water.
- Weston Solutions of West Chester, Pennsylvania, is using a technology developed through NASA STTR funding to clean up high concentrations of harmful chlorinated solvents from dye and paint manufacturers, dry cleaners, chemical manufacturers, metal cleaning and degreasing facilities, pharmaceutical and aerosol manufacturers, and other industries.
- Quantum Devices of Barneveld, Wisconsin, has commercialized light-emitting diode (LED) chips funded through SBIR at NASA's Marshall Space Flight Center. Initially used to grow plants on the Space Shuttle and International Space Station, these lights are now used for healing wounds and providing temporary relief from chronic pain due to arthritis, stiffness, and muscle spasms.
- Triangle Research and Development Corporation of Research Triangle Park, North Carolina, has used a robotic vision system and SBIR funding from NASA's Goddard Space Flight Center to develop sophisticated crash test dummies and models being used by automobile and component manufacturers in vehicle testing worldwide.

- Mineral identification technologies for Mars rovers, developed with SBIR funding from NASA's Jet Propulsion Laboratory, has been commercialized by InPhotonics of Norwood, Massachusetts for use by U.S. law enforcement agencies and military personnel to identify suspicious liquid and solid substances through glass and plastic packaging materials.
- Ballistic Recovery Systems of St. Paul, Minnesota, has commercialized a lightweight parachute developed with SBIR funding from NASA's Langley Research Center, for emergency use by small airplanes, saving many lives.
- Alcon Laboratories of Fort Worth, Texas has used laser tracking technology for spacecraft rendezvous and docking, developed with SBIR funds from NASA's Johnson Space Center, to commercialize an eye-tracking device for LASIK surgery that tracks eye movements at four times the established safety margin.

Both the SBIR and STTR programs have evolved and matured over time and NASA continues to pursue ways to improve program efficiency and effectiveness. NASA is seeking to improve the effectiveness of the program through achieving increased infusion into programs and projects. By increasing the degree of integration of SBIR/STTR investments into the overall technology development portfolio of NASA's four Mission Directorates (Science, Aeronautics, Space Operations, and Exploration Systems), SBIR/STTR investments will address specific technology gaps, be complementary to other investments, and achieve greater infusion.

Each of the 11 agencies participating in the SBIR program implements the program a little differently, based on their mission objectives. Flexibility in the administration of the program -- not using a "one size fits all" approach -- has been critical to its success. The ability for each agency to adjust funding levels, define areas of research or subtopics of priority, pursue opportunities for cost sharing, have all greatly enhanced the ability to accelerate projects that have potential for infusion into agency Mission programs and/or commercialization. Flexibility does contribute to program effectiveness by allowing agencies to tailor to their specific needs.

Appropriate Program Award Levels

Adjusting the maximum award levels for phase 1 and 2 to account for inflation would be desirable, if agencies retained the flexibility to adjust awards as appropriate within those bounds. While higher awards would result in fewer awards, the advances achieved by those awardees would be greater given the increased level of funding. A key obstacle for achieving infusion or commercialization success is developing technologies of sufficient maturity or "technology readiness level" in NASA jargon. Higher award levels would help increase the maturity of technologies resulting from the SBIR/STTR investments, thus reducing the risk of incorporating those technologies into missions and increasing the likelihood of infusion.

Small Business Participation

Participation in NASA's SBIR/STTR programs has continued to be more than satisfactory. NASA continues to host a population on average of proposal submits that range between 1,700 and 2,200 proposals annually. NASA's outreach efforts at conferences and workshops continue to focus on increasing participation by the small business community. NASA continues to see a flow of firms new to the NASA SBIR program each year and NASA's SBIR program is working closely with NASA's Office of Small Business Programs (OSBP) to more effectively reach socially and economically-disadvantaged and women-owned small businesses. Achieving higher infusion into programs and projects, a key objective of NASA's SBIR/STTR program, will result in increased Phase III funding for small businesses.

Financing and Commercialization

NASA is pursuing several program improvements targeted at enhancing technology infusion into NASA programs, as well as commercialization assistance specific to the companies' individual needs. NASA has recently consolidated its SBIR/STTR program structure to reduce administrative overhead and to focus more clearly on the infusion of SBIR/STTR technologies into the agency mission programs. Providing commercialization assistance as an integral part of SBIR/STTR awards could be beneficial, particularly if the award levels were increased, as business acumen is not always present in technological innovators. Existing Phase III SBIR/STTR authorities allow access to SBIR/STTR firms for continued technology development work with non-SBIR program funding on a sole-source basis, without the need for a 'justification for other than full and open competition' or JOFOC. This authority has been beneficial and NASA is seeking to make fuller use of this authority. It provides incentives for NASA's development programs and their prime contractors to continue funding SBIR technologies, and has great potential to increase the infusion of SBIR/STTR technologies into NASA programs and projects, and to increase the amount of federal procurement funding going to SBIR/STTR firms.

Administrative Costs

Administrative cost continues to be a challenge in the SBIR/STTR programs. In October 2006, NASA initiated a new consolidated structure for the NASA's SBIR/STTR programs. The new program structure seeks to reduce program administrative cost, increase operational efficiency, and supports an additional set of objectives focused on technology infusion of SBIR/STTR developed results into Mission Directorate programs, while leveraging more of their resources for administrative support in the program. Allowing agencies to use a portion of SBIR/STTR program funds to support administrative costs would give agencies more flexibility.

Venture Capital Majority Ownership

The objective of SBIR/STTR is to support small businesses that are contributing to agency missions and the nation's economy. The willingness of venture capital firms to invest in a small business is a positive indicator that people who are putting their money at risk believe in the success of a company. Thus, some venture capital participation might be a good indicator of the likelihood of a small business's future success. Venture capital companies, and other commercial partners, are encouraged to invest in SBIR awardees and may own up to 49 percent of an awardee firm's equity, so long as they do not have the power to control the firm.

However, because a lack of access to capital is one of the defining characteristics of small business, a majority ownership by venture capital organizations may indicate that business is no longer appropriately labeled small and its participation in the SBIR/STTR program needs to be reviewed by the Small Business Administration (SBA) to ensure that its participation continues to meet the intent of the SBIR/STTR legislation. In addition, we have to ask whether funds provided by venture capital firms might merely be a substitute for set-aside SBIR funds that might be more productively used for projects with no venture capital participation. SBA has issued an Advance Notice of Proposed Rulemaking (ANPRM) and is addressing this issue through its public rule-making process.

In closing, NASA supports the SBIR/STTR programs. Technological innovation is vital to the performance of NASA's Mission and the Nation's prosperity and security.