

**SCIENCE, AERONAUTICS AND TECHNOLOGY
FISCAL YEAR 1998 ESTIMATES
BUDGET SUMMARY**

**OFFICE OF AERONAUTICS AND SPACE TRANSPORTATION
TECHNOLOGY COMMERCIAL TECHNOLOGY / SBIR**

SUMMARY OF RESOURCES REQUIREMENTS

COMMERCIAL TECHNOLOGY / SBIR	FY 1996	FY 1997	FY 1998
Commercial Technology Programs	27,400	25,800	20,000
Technology Transfer Agents	17,100	7,800	7,800
Small Business Innovation Research Programs	125,700	125,000	125,000
Total	170,200	158,600	152,800

Distribution of Program Amount by Installation	FY 1996	FY 1997	FY 1998
Johnson Space Center	24,300	17,800	17,600
Kennedy Space Center	5,700	6,500	6,800
Marshall Space Flight Center	23,200	30,900	34,900
Stennis Space Center	4,000	4,100	4,400
Ames Research Center	14,100	15,600	15,100
Dryden Flight Research Center	4,800	4,300	4,800
Langley Research Center	20,500	20,700	18,600
Lewis Research Center	20,300	22,100	19,500
Goddard Space Flight Center	29,500	27,000	25,900
Jet Propulsion Laboratory	2,800	2,200	1,700
Headquarters	21,000	7,400	3,500
Total	170,200	158,600	152,800

COMMERCIAL TECHNOLOGY PROGRAM

BASIS OF FY 1998 FUNDING REQUIREMENT (Thousands of Dollars)	FY 1996	FY 1997	FY 1998
Technology Dissemination & Marketing	6,400	6,900	3,100
Electronic Network	700	800	900
Business Practices Implementation	17,600	15,800	14,600
Policy, Metrics, & Evaluation	2,000	1,800	900
Culture Change & Education	700	500	500
Total	27,400	25,800	20,000

PROGRAM GOALS

The commercial technology program goal is to share the harvest of NASA's technology programs with the U.S. industrial community. The goal encompasses the commercialization of technology developed in all the Agency's Enterprises, in past as well as current programs. The scope of the commercialization effort includes technologies created at NASA centers by civil servants and innovations from NASA contractors. The technology commercialization program assures that NASA's technology developments contribute to a significant improvement in the quality of American life and an increase in America's international competitiveness.

STRATEGY FOR ACHIEVING GOALS

NASA is continuing to implement a new way of doing business in the area of technology transfer. Changes in national R&D investment guidelines have elevated commercial technology transfer to a fundamental NASA mission. NASA's Agenda for Change, approved by Administrator Goldin in July 1994, is the agency's blueprint for achieving this mission. The Agenda for Change is organized into six sections, each reflecting an important aspect of this new way of doing business. The six sections are: Commercial Technology Policy; Commercial Technology Business Practices; Marketing NASA's Capabilities; Commercial Technology Metrics; Culture Change Through Training and Education; and the Commercial Technology Electronic Network. Each section implements components of the national and agency policies in order to reinvent the way that NASA transfers technology to and from the national economy.

Two elements of the Agenda for Change are particularly important for the overall goal to be reached. The first element involves the establishment of metrics which allow program managers to determine the success rate of the various strategies. Four categories of metrics

technology transfer. This network is now fully operational and accessible to the public via the Internet, and includes all current, non-sensitive technology activities and opportunities. To succeed, the commercial technology mission must become a responsibility of every NASA employee, contractor and industry and academic partner. The Agenda for Change marks the beginning of NASA's new focus, management commitment, and employee empowerment to improve our contributions to America's economic security through the pursuit of our aeronautics and space

missions. All NASA program offices and field centers are beginning to invest appropriately in technology commercialization efforts, and NASA has adopted a near-term target of investing 10-20 percent of the agency's R&D budget in commercial partnerships with industry by the end of FY 2000

MEASURES OF PERFORMANCE

Performance Metric	Plan	Actual/Revised	Description/Status
Implement a detailed general targeted marketing strategy	October 1995	February 1996	Marketing NASA technology and capabilities to industry is critical to NASA's ability to form partnerships with the private sector. A general and targeted marketing campaign will make it possible to understand industry's R&D requirements and identify where the synergies of NASA and industry technology partnerships can be most beneficial.
Complete Inventory of 100% of NASA technologies	September 1996	April 1996	The inventory of all NASA technologies provides an agency-wide perspective on available NASA technologies and facilitates finding potential partners for commercial ventures.
Complete documentation that 10% of NASA's R&D budget is in commercial partnerships with industry.	September 1996	September 1996	Successfully reaching 10% meets the lower range of National Performance Review goal for the agency.

Establish Internet-based access to the NASA commercial technology database.	September 1996	April 1996	Internet access will provide searchable industry and public archives and increase the effectiveness of technology transfer.
Increase the percentage of NASA R&D Invested in Commercial Partnerships with a goal of achieving 15%.	October 1997	--	Showing steady improvement toward reaching 20% will provide assurance that we can meet the upper range of the National Performance Review goal for the agency.
Inventory all new technology from new contracts initiated in FY 1997	December 1997	--	Keep technology archives updated to maintain maximum relevance to private sector.
Expand training program for NASA R&D program managers.	April 1998	--	Expanded training should help foster the agency's internal culture change necessary to increase technology transfer and partnerships with private industry.
Assess approximately 100% of NASA technology for commercial application.	December 1998	--	Current inventory of technology will be reviewed, assessed and rated for commercial potential.

ACCOMPLISHMENTS AND PLANS

In FY 1996, particular focus was on achieving the goal of investing 10 percent of the NASA R&D budget in commercial partnerships with industry. Based on experience to date, these commercial partnerships are expected to increase the return on the government's R&D investment, allowing NASA to do more with limited funds, as well as strengthening the international competitiveness of key industry sectors. FY 1996 efforts also included the initiation and demonstration of an automated, on-line, metrics collection system and technology transfer success story database (TechTracS) for customer and stakeholder use. Another key activity in FY 1996 was the initiation of an Internet-based electronic network to integrate and support NASA's technology commercialization operations throughout the U.S. This network draws upon the TechTracS system and provides U.S. industry and research organizations with electronic access to information and databases which highlight available

NASA technologies, technical expertise and facilities. A professional training course on commercial technology was also initiated as part of the agency's program managers' training program, which focuses on increasing both technology transfer and business partnerships between NASA and the private sector.

In FY 1997 and 1998 the emphasis will be on increasing commercial partnerships with industry and continuing refinement of the technology and partnership database, updating it to include new agency contracting efforts and to describe new technologies that are to be made public on the electronic network. The agency's goal for these years will be to increase the percentage of the NASA R&D budget in commercial partnerships with industry to 15 percent. In FY 1997 and 1998, NASA will also continue to utilize and improve the Internet as an electronic marketplace for NASA technology assets, facilitating technology transfer and commercialization opportunities between U.S. industry and NASA. In addition, a series of training opportunities focused on the commercial technology strategy and its implementation actions will be expanded within NASA's standard program management professional training program.

TECHNOLOGY TRANSFER AGENTS

<u>BASIS OF FY 1998 FUNDING REQUIREMENT</u> (Thousands of Dollars)	FY 1996	FY 1997	FY 1998
National Technology Transfer Center	7,500	7,800	7,800
ADANET Project	2,100	--	--
Rural State Technology Transfer Center	4,500	--	--
Commercial Spaceport Activities	3,000	--	--
Total	17,100	7,800	7,800

PROGRAM GOALS

The goal of technology transfer agents, such as the National Technology Transfer Center (NTTC), is to facilitate the transfer and commercial use of federally-sponsored research and technology (and associated capabilities) to the U.S. private sector. The increased use of this research and technology will enhance U.S. economic growth and industrial competitiveness.

STRATEGY FOR ACHIEVING GOALS

Since 1990, the NTTC, managed by Wheeling Jesuit College in West Virginia, has served the

federal government as a national technology transfer and commercialization resource center. It has been funded since 1990 through a NASA cooperative agreement, with this agreement serving all federal agencies. NASA's comprehensive review of the NTTC in FY 1996 established new roles, objectives and guidance for the NASA-supported operations of the NTTC, bringing its activities closely in line with NASA's Agenda for Change.

In furthering the goals of the Agenda for Change and other supporting federal agencies, the NTTC performs four core roles: (1) to serve as a national gateway for federal technology transfer and commercialization, assisting U.S. industry to locate and access federally-sponsored technology resources and sources of technical/business assistance; (2) to develop, integrate and utilize national databases to enable efficient access to federally-funded research and technology resources; (3) to develop and deliver professional-level training in technology transfer and commercialization for federal agencies and other public and private sector audiences; and (4) to promote U.S. industry awareness of federal-sponsored research and technology resources, as well as opportunities and methods for technology transfer and commercialization.

MEASURES OF PERFORMANCE

Performance Metric	Plan	Actual/Revised	Description/Status
Increase Utilization of NTTC.	October 1996	October 1996	Process 15,000 information and technical requests from U.S. industry to NTTC for the fiscal year. Process in place in FY 1997 to maintain this level of support at minimum.
Provide 6000 annual referrals through NTTC to Government-funded technology/business sources.	October 1996	October 1996	Fully processed requests result in qualified referrals to NASA field centers, other Federally-sponsored research and technology resources, or Federal/State sources of technical/business assistance. Process in place in FY 1997 to maintain this level of support at minimum.

Assess NTTC cost effectiveness	October 1996	October 1996	NTTC will track the average cost/benefit ratio for technical requests processed by the Gateway service to assess cost effectiveness relative to prior years and to other relevant benchmarks. Effectiveness in future will be measured by NTTC's performance in Marketing, Practices, Electronic Network, Metrics and Training program areas, as defined in 1997 operating plan
Increase by 25% Federally-funded research and technology information available via the Internet/World Wide Web.	October 1996	July 1996	NTTC will increase public access to Federal research and technology information. Goal accomplished with the implementation of "NASA TechTracS" plus maintenance of "Business Gold" - both on the World Wide Web.
Establish annual NTTC plan.	November 1996	December 1996	By November 1 each year, establish an operating plan incorporating NASA guidance and direction. In FY 1997, annual plan was restructured to reflect clearer partnership responsibilities.
Transition NTTC training services to full cost-recovery.	September 1997	October 1996	NTTC is to transition during FY 1997 to full cost recovery for on-going training services and programs provided to private and public sector audiences. Goal accomplished for private training. NASA now pays only for the training it receives.

In partnership with NASA, implement six national con-ferences, including Tech 2007	September 1998	--	Furthers the Agenda for Change goal of marketing NASA's capabilities. Follow-on technology symposiums to the Tech 2007 are also to be supported.
In partnership with NASA, target specific industries and companies who may benefit from NASA technology and develop marketing strategies to those industries and firms.	September 1998	--	Supports the Agenda for Change goal of marketing NASA's capabilities.
In partnership with NASA, expand and deliver the Technology Transfer & Commercialization training course as part of NASA's PPMI.	September 1998	--	Supports the Agenda for Change goal of fostering an internal agency culture change through training and education. Course has now been developed, and is to be delivered on a recurring basis.
In partnership with NASA, develop and deliver a professional training program for US industry.	September 1998	--	The goal of this training will be to better enable companies to successfully commercialize NASA technology

ACCOMPLISHMENTS AND PLANS

The NTTC gateway service produces qualified referrals to federal laboratories and other federally sponsored sources of technology and assistance throughout the nation. The gateway includes telephone calls to the NTTC 1-800 number, Techfinder requests via e-mail, and TechBrief magazine reader request cards. Organizations receiving referrals include NASA, Environmental Protection Agency, Department of Commerce, Department of Energy, Department of Defense, Department of Agriculture, and R&D universities. In support of its gateway and Internet services, the NTTC continues to develop and integrate a unique collection of databases.

In the area of professional training, a unique two-day training course was developed in FY 1996 and is now offered by the NTTC in partnership with NASA, targeting NASA managers

Consortium for Technology Transfer, and other federal agencies to increase U.S. industry awareness of federal technology transfer resources and opportunities.

The ADANET program has been a successful effort in software reuse. It was completed in FY 1996, with no further funding requirements. During FY 1996, in conformance with Congressional direction, NASA initiated a cooperative agreement with the Montana State University (MSU) to establish a Rural Technology Transfer & Commercialization Center. This Center will use the funds provided over a period of 4 1/2 years, and will provide services focused on the upper plains state region's core industries (agriculture, timber and mining) and small technology-based business enterprises. Also in conformance with Congressional direction, NASA initiated a grant program in FY 1996 for the development of state-sponsored commercial spaceport business plans and the construction or modification of commercial spaceport infrastructure. No further NASA funding is required for this activity. After FY 1996, funding within the Technology Transfer Agents program is requested only for the NTTC.

SMALL BUSINESS INNOVATION RESEARCH PROGRAMS

<u>BASIS OF FY 1998 FUNDING REQUIREMENT</u> (Thousands of Dollars)	FY 1996	FY 1997	FY 1998
Small Business Innovative Research	125,700	125,000	125,000

PROGRAM GOALS

The goals of NASA's Small Business programs are to promote the widest possible award of NASA research contracts to the small business community and to facilitate commercialization of these by the small business community of the results of this research.

STRATEGY FOR ACHIEVING GOALS

Established by Congress, the Small Business Innovation Research (SBIR) program helps NASA develop innovative technologies by providing competitive research contracts to U.S. owned small businesses. The program is structured in three phases:

Phase I is the opportunity to establish the feasibility, technical merit and desirability of a proposed innovation. Selected competitively, Phase I contracts last for six months and currently do not exceed \$70,000.

Phase II is the major R&D effort in SBIR. The most promising Phase I projects are selected to receive contracts worth up to \$600,000 and lasting up to two years. In general, about 50

percent of Phase I projects are approved for Phase II.

Phase III is the completion of the development of a product or process to make it marketable. The financial resources cannot come from SBIR funds. Private sector investment in various forms is the usual source of Phase III funding.

The NASA SBIR solicitation has 15 major topic areas, which are divided into sub-topics. The description of each of these sub-topics is developed by various NASA installations to include current and foreseen Agency program needs and priorities. NASA typically receives 2200 or more individual proposals each year. Proposals are evaluated by the NASA field centers for scientific and technical merit, key staff qualifications, soundness of the work plan and anticipated commercial benefits. NASA Headquarters (HQ) program offices provide additional insight into commercial applications, program balance, and critical Agency requirements. Selections are made by NASA HQ based upon these recommendations and other considerations. Typically about 400 Phase I awards are selected each year.

In addition to an extensive on-line database regarding the program, NASA also provides information for public access via a bulletin board service and Internet servers. Moreover, NASA has begun to use information technology for the process of developing the technical sub-topics in the solicitation, for the public release of the solicitation in electronic formats and for proposal evaluation. The end-to-end electronic solicitation process is serving as a prototype not only within NASA, but across the government.

Several other innovations have been introduced or strengthened this past year in the small business programs. A detailed, external evaluation of each proposal's ultimate commercial potential is now included in the selection process. In addition, a comprehensive, systematic review of past SBIR projects' post-Phase II, commercial and or mission applications has been initiated. The information from the review will be used to identify critical predictors of commercial viability and, therefore, to increase the effectiveness of the programs. Finally, a new approach is being continued and strengthened to focus several subtopics into specific NASA mission applications. The intent is to more closely tie the SBIR activity to the primary mission needs of each NASA enterprise. The pathfinder for this program has been a collection of subtopics in the general aviation program.

The NASA SBIR program has contributed to the U.S. economy by fostering the establishment and growth of over 1100 small, high-technology businesses. At least 225 private ventures have been initiated based on NASA SBIR programs. Twenty major participants have produced more than \$150 million in new revenues.

MEASURES OF PERFORMANCE

Performance Metric	Plan	Actual/Revised	Description/Status
Select and announce new SBIR Phase I awards resulting from the FY 1995 solicitation.	October 1995	October 1995	Meets the requirements of public law.
Select and announce new SBIR Meets the requirements of public law. Completed November 1995. Phase II awards resulting from the FY 1995 solicitation.	November 1995	November 1995	Meets the requirements of public law.
Complete development and issue the FY 1996 STTR solicitation	January 1996	January 1996	Necessary to ensure the success of the FY 1996 research program.
Compile commercialization metrics from 30% of previous Phase II awardees.	February 1996	April 1996	Data collected on the Phase II awardees from the previous two years will improve knowledge of the success of the program in actually commercializing technology.
Select and announce new STTR Phase I awards resulting from the FY 1996 solicitation	May 1996	May 1996	Meets the requirements of public law
Complete development and issue the FY 1996 SBIR solicitation.	June 1996	June 1996	Necessary to ensure the success of the FY 1996 research program
Select and announce new SBIR Phase I awards resulting from the FY 1996 solicitation.	December 1996	January 1997	Initiates awards for new solicitation

Complete development and issue the FY 1997 SBIR solicitation.	April 1997	--	Necessary to ensure the success of the FY 1997 research program.
Select and announce new SBIR Phase I awards resulting from the FY 1997 solicitation.	August 1997	--	Initiates awards for new solicitation.
Select and announce new SBIR Phase II awards resulting from the FY 1996 solicitation.	December 1997	--	Initiates the follow-on awards resulting from prior Phase I results.
Complete development and issue the FY 1998 SBIR solicitation.	April 1998	--	Necessary to ensure the success of the FY 1997 research program.
Select and announce new SBIR Phase II awards resulting from the FY 1997 solicitation.	September 1998	--	Initiates the follow-on awards resulting from prior Phase I results.
Select and announce new SBIR Phase I awards resulting from the FY 1998 solicitation.	September 1998	--	Initiates awards for new solicitation.

ACCOMPLISHMENTS AND PLANS

At the end of FY 1996, a paperless electronic process for SBIR proposal information management systems was created. Our electronic management system has resulted in steady improvements in program implementation efficiency.

FY 1997 and 1998 will include new SBIR Phase I and Phase II awards, and continued emphasis on and evaluation of commercial successes and successful applications to NASA programs. By February 1997, 1995 Solicitation Phase II awards and 1996 Solicitation Phase I awards will be awarded and under contract or in contract negotiation. In FY 1998, announcements will be made for the 1996 Solicitation Phase II awards and the 1997 Phase I awards.