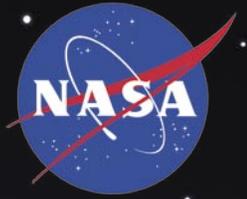


National Aeronautics and Space Administration



2007

accomplishments

Goddard's
Innovative Partnerships
Program Office

*Strategically Promoting NASA Goddard as a
Technology Partner of Choice*



How

are we innovative?

Read on to find out.

contents

page 2	Technology Infusion
page 14	Technology Transfer
page 22	IP Management
page 32	Contact Us

Making Goddard a Technology Partner of Choice

As chief of the Innovative Partnerships Program (IPP) Office at NASA Goddard Space Flight Center, I am tasked with ensuring that we live up to our name. Innovation was, is, and will remain key to NASA's ability to research, invent, and explore. Innovation benefits NASA's mission goals as well as those of our valued partners, and it helps to bolster economic security and the public good.



Nona Cheeks

As we enter the 50th year of NASA's history, we recognize this long-honored tradition of innovation and are working to sharpen our focus even further. Just as NASA researchers were very strategic in their efforts to fulfill NASA's exploration goals in the wake of the Sputnik launch, we in the IPP Office are strategically working to support NASA's current objectives to return to the Moon, Mars, and beyond.

- We endeavor to be innovative in **technology infusion** efforts—to help meet Goddard needs and NASA mission directorate goals, and to support the growth of growing businesses.
- We endeavor to be innovative in **technology transfer** efforts—to better the regional and U.S. economies and to extend the application of Goddard technologies to uses that will serve the public good.

- We endeavor to be innovative in **intellectual property (IP) management**—to protect Goddard's IP and serve the interest and future research capabilities of Goddard scientists.

We endeavor to be innovative in all of these things by strategically positioning Goddard as a **Technology Partner of Choice**. Through innovative efforts to infuse technology into Goddard, manage Goddard's IP, and transfer

technology out of Goddard, we are strengthening relationships with Goddard innovators and managers; other NASA Centers; industry; academia; and other federal, state, and nongovernmental organizations—for the mutual benefit of all parties and ultimately to help NASA successfully achieve its mission goals more efficiently.

We invite you to read this summary of the successes we've seen in fiscal year 2007 in transforming these ideas into innovation.

Nona Minnifield Cheeks
 Chief
 Innovative Partnerships Program Office
 NASA Goddard Space Flight Center

"We endeavor to be innovative by strategically positioning Goddard as a Technology Partner of Choice."

— Nona Cheeks, Chief, Goddard's IPP Office



Innovative:

finding ways to help everyone win

The header features the text "Technology Infusion" in a white, serif font against a dark, horizontal rectangular background. The background image is a blurred, bokeh-style photograph of light sources, possibly stars or distant galaxies, in shades of white and yellow against a dark brown or black backdrop.

Technology Infusion

At Goddard's IPP Office, we understand the importance of infusing technology from industry, academic, and government sources into NASA missions to achieve the goal of returning to the Moon, Mars, and beyond. Forming partnerships in which both NASA and its collaborator have something valuable to contribute to address the other's technology need allows both parties to use fewer resources to address their respective challenges. For NASA, this not only accelerates space mission research and development (R&D), but it also makes R&D more cost-efficient, which is a benefit for taxpayers.

Major aerospace companies already seek collaboration opportunities with NASA. Many times these arrangements fall under more traditional work-for-hire contractual arrangements. Goddard's IPP Office targets the "unusual suspects"—that is, companies, university departments, and government labs that might not immediately recognize that they have something to offer NASA and vice versa. When these organizations have a need that overlaps with NASA's needs, the IPP Office seeks a technology infusion partnership.

Through our SBIR/STTR program, new and expanded sources of funding for infusion research and other high-impact agreements, FY07 brought many successes for technology infusion at Goddard.

technology infusion

innovative: Mining for funding and research expertise through SBIR and STTR programs

The Small Business Innovative Research and Small Business Technology Transfer (SBIR/STTR) programs are designed to stimulate technological innovation in the private sector to meet federal research and development needs. The three-phase approach enables small businesses to develop a technology in response to a specific set of NASA mission-driven needs.

- In Phase I, researchers establish the technical feasibility and merit of a proposed innovation.
- Proposals awarded contracts may proceed to Phase II, in which the bulk of the R&D efforts occur.
- In Phase III, the result of Phase II is infused into NASA programs, other government organizations, and/or the commercial marketplace.

At Goddard, FY07 brought with it many SBIR/STTR research contracts, several of which have successfully entered Phase III and are expected to directly benefit a NASA mission or need.

For more information about the program details and phases, visit: <http://sbir.gsfc.nasa.gov>

More than 30 companies received SBIR/STTR funding in FY07, totaling \$3.5M.

AOS goes from Phase I to Phase III to benefit the Hubble Space Telescope



Hubble Space Telescope

As FY07 came to a close, NASA was beginning its second Phase III SBIR contract with Advanced Optical Systems, Inc. (AOS) of Huntsville, AL. The company's latest contract is designed to directly benefit the Hubble Space Telescope (HST) through the conceptualization and build of the "Hybrid Guidance Sensor III," a system to aid satellite rendezvous and docking. The hybrid sensor combines AOS's Ultor sensing technology (which was developed as part of an SBIR contract with the U.S. Navy), and Marshall Space Flight Center's Advanced Video Guidance Sensor (AVGS). Ultor uses a camera and natural illumination (e.g., sun, stars, etc.), while AVGS illuminates with a laser and reflections off of targets. Combining the two technologies provides redundancy and therefore robustness and reliability to aid the critical docking process.

Now in Phase III, NASA and AOS are in the process of testing the new system using facilities at Goddard and Marshall Space Flight Center. Testing is expected to be completed in early 2008, and researchers expect the technology to benefit not only the HST but other NASA missions requiring rendezvous and docking, such as ORION. And beyond NASA, applications exist within the Department of Defense (DoD), Navy, Army, and Air Force. Outside government and military applications, the technology may also be useful in helping to dock ships in ports, maintaining precise distances between ships for resupply operations, and other uses.

SBIR contract with Bauer Associates yields improved nanoscale optical measurement techniques

Another SBIR Phase III agreement—this time with Bauer Associates, Inc. of Wellesley, MA—stands to benefit many NASA missions. The organization conceived of and proved the theory behind a new concept for optically measuring large mirror surfaces. During Phase II of the SBIR contract, researchers developed a working prototype instrument that utilizes a non-interferometric, optical technique for measuring absolute aspheric shape over the full surface of large mirrors to the nanometer level, without the need for known reference surfaces, simplifying R&D efforts. Moving into Phase III, Bauer worked with the Smithsonian Astrophysical Observatory to use



Hubble Space Telescope

the prototype to measure the surface of NASA's High-Resolution X-Ray Explorer (HIREX) Pathfinder mirror. And multiple Phase II follow-on contracts are underway to further develop the capabilities of this technology.

Meanwhile, commercialization talks are ongoing with an established manufacturer of large optics to develop and integrate the instrument into the company's fabrication and metrology facilities. Through IPP funding, this agreement has addressed a NASA need while helping a small business develop a new product that has commercial as well as NASA potential, providing benefits to NASA, the company, and the U.S. economy.

technology infusion

innovative: Combining resources to make great things possible through the IPP Partnership Seed Fund

The IPP at NASA Headquarters established the Partnership Seed Fund to address barriers and initiate cost-shared, joint-development partnerships, providing “bridge funding” to enable larger partnerships and development efforts. Each year, Goddard’s IPP Office coordinates and advises the proposal efforts for projects including partnerships with other government agencies, small and large businesses, universities, and other NASA Centers. In the sections that follow, we discuss the progress that was made in FY07 on Seed Funded projects, and introduce the new proposals that were selected for funding.

2006 IPP Seed Fund recipients make great progress

Recipients of 2006 Seed Funding spanned a wide variety of research goals, from optics to exploration planning. The IPP Office managed the submission process for Goddard, developing an innovative process for reviewing many proposals and then selecting and aiding the development of the proposals submitted to NASA Headquarters. The Goddard recipients that received funding in 2006 have been hard at work on the jointly funded research that stands at the helm of benefiting many important NASA missions. These recipients made significant progress in FY07, as discussed in the stories that follow.

Advancing and lowering the cost of NASA's next-gen X-ray and IR telescopes

A Seed Fund partnership among Goddard, Lake Shore Cryotronics, and Lockheed Martin (LM) is helping researchers advance the technology readiness level (TRL) of Goddard’s Continuous Adiabatic Demagnetization Refrigerator (CADR) through complementary design changes in control electronics and cryogenic components. These advancements will benefit future missions by enhancing the temperature stability of high-resolution X-ray and infrared (IR) telescopes that make observations with detectors cooled to ultra-low temperatures. Progress to date includes control voltage calculations and improved stability of the system.



NASA Goddard researcher Peter Shirron is collaborating with Lake Shore Cryotronics and Lockheed Martin to advance his innovative adiabatic demagnetization refrigerator (CADR) technology.

Benefits to NASA

NASA will benefit significantly from this partnership, which is contributing directly to NASA’s need to demonstrate a system that meets all cooling requirements for upcoming missions. The partnership work will:

- Enable Goddard to provide detectors and instruments for a wide range of future X-ray, submillimeter and IR missions
- Provide significant cost and schedule savings by reducing the cost and duration of flight electronics development
- Offer significant benefits to high-profile missions such as Constellation-X and to a Goddard X-ray instrument on the Japanese New X-ray Telescope (NeXT) mission

Lowering the cost and risk of the Hubble and James Webb Space Telescopes

Another IPP Seed Fund partnership with Teledyne Technologies is enabling the development and testing of new concepts for very large astronomical focal planes. The project aims to provide the extreme performance required for future NASA missions that call for large-format focal planes to cover the field of view, as well as precision guiding to support high spatial resolution to achieve very high signal-to-noise ratios for transient phenomena such as planet transits. To date, researchers have demonstrated simultaneous imaging and guiding of Teledyne's sensor chip assembly and are working with the company to develop a new sensor chip assembly for testing that will be suitable for use in space astrophysics.



The James Webb Space Telescope (pictured) may benefit from Seed Fund work with Teledyne.

Developing new remote sensing

With support from the IPP Seed Fund, ITT Space Systems is working collaboratively with Goddard and Marshall Space Flight Centers to advance the TRL of a multi-core glass mirror architecture, helping to meet the needs of next-generation large space telescopes. Goddard researchers are conducting acoustic, vibration, and ambient-temperature figure testing of ITT Space Systems' multi-core mirror architecture, and Marshall will carry out cold figure testing with facilities developed for the JWST program. To date, researchers have completed the design of a 2.8 kg mirror, which has passed preliminary acoustic testing at Goddard. A second mirror is currently being fabricated. Subsequent integrated structural modeling will enable a physical understanding of mirror performance.

Benefits to NASA

The work will:

- Provide NASA with a new architecture for future large observatories in space
- Lower cost and risk while improving performance, significantly benefiting future missions that require large-format focal planes, in particular HST and the James Webb Space Telescope (JWST)
- Possibly benefit future NASA missions requiring extreme spatial resolution with the largest feasible fields of view, including the Joint Dark Energy Mission (JDEM) and the Microlensing Planet Finder (MPF)
- Provide the credibility and technology readiness level (TRL) necessary to ensure low-risk implementation in these and other future missions

Benefits to NASA

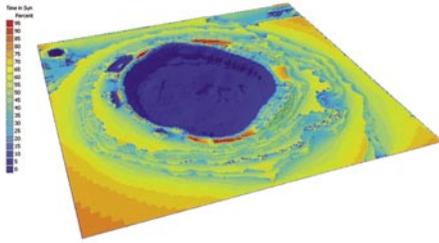
A primary objective of the work is to enable ITT to provide mirrors for missions, such as the Single Aperture Far-Infrared (SAFIR) Observatory, more rapidly and at a much lower cost. NASA stands to benefit greatly through:

- Availability of more cost-effective remote sensing technologies that will help researchers better see, detect, and measure the Earth, Sun, solar system, and universe
- A higher level of technology readiness that will likely impact NASA, as well as other federal agencies (e.g., Department of Homeland Security, Defense Advanced Research Projects Agency) and commercial entities

technology infusion



ILIADS



2006 IPP Seed Fund recipients make great progress *(continued)*

Integrating software to improve lunar images, data, and overall missions

An IPP Seed Fund partnership between Goddard and United Space Alliance (USA) was formed this year to integrate Goddard's Integrated Lunar Information Architecture for Decision Support (ILIADS) lunar Geospatial Information System (GIS) software tools with USA's Questus™, a crew-centric management and planning applications suite specifically developed for space mission operations. Research aims to help lunar exploration engineers, scientists, mission operations personnel, and exploration crews sift through and extract meaningful information from environmental and situational data from multiple sources, in order to make the most effective decisions to drive exploration. To this end, researchers are constructing a comprehensive planning and decision support capability that can be used for near-term Lunar Precursor and Robotic Program (LPRP) exploration mission formulation studies, and to conduct real-time and safe crew-centric lunar sorties in the long term. To date, researchers have demonstrated the capabilities of the integrated software, have begun defining and implementing interface control documents, and are developing a model.

(Editor's Note: A separate project with USA has also received Seed Funding for 2008. See the story on page 11 for details.)

Benefits to NASA

The ILIADS–Questus integration will:

- Provide access to lunar environment and mission information that can be easily retrieved, visualized, and correlated
- Benefit the Lunar Reconnaissance Orbiter (LRO), enabling NASA to capture and utilize lunar data/images with much greater resolution than ever before
- Serve as a potential revenue stream for NASA as commercial opportunities for lunar exploration arise

“I don't think this partnership could have happened without the support of Goddard's Innovative Partnerships Program Office and the Agency's new Seed Fund. I am so pleased to see NASA putting real resources toward initiating partnerships. There will be very real benefits to specific NASA objectives in terms of both cost and capabilities.”

— Julia Loftis, Goddard Innovator

“All five Goddard proposals that were awarded Seed Funding this year are bringing in outside funds to develop innovations that will ultimately provide very real benefits to NASA missions while lowering costs. Fueling more discovery by combining shared research interests with our partners is something we can all be happy about.”

— Nona Cheeks, Chief, Goddard's IPP Office

Seed Fund recipients chosen for 2008

The IPP Office again coordinated proposal efforts for the Center in FY07, yielding five winning proposals. Principal investigators for these projects are looking toward highly innovative goals for their funded research in 2008.

Enabling autonomous and computationally intensive capabilities for NASA missions

Building upon an \$18M DoD investment, a Seed Fund collaboration among Goddard, NASA's Jet Propulsion Laboratory (JPL), and Coherent Logix of Austin, TX will enable researchers to radiation-harden a high-performance, low-power processor that can enable or enhance computationally intensive NASA spaceflight capabilities. The performance and power efficiency of the resulting device is expected to be significantly superior to current state-of-the-art spaceflight processors. Goddard researchers expect that the radiation-tolerant version of the processor resulting from this collaboration will be critical to achieving NASA's performance goals for many spaceflight capabilities currently in development, such as autonomous landing and hazard avoidance technology (ALHAT), rover stereo vision and path planning (i.e., autonomous surface mobility), autonomous rendezvous and capture (AR&C), and adaptable communications systems.

Lowering the cost and risk of avionics systems for NASA missions

Researchers from Goddard and the Air Force Research Laboratory (AFRL) will use Seed Funding to develop a spacecraft global positioning system (GPS) receiver with a SpaceWire-based plug-and-play (PnP) interface that will be applicable for multiple missions and provide NASA insight into building a PnP spacecraft. Reusable components like this receiver can dramatically reduce design time and costs for spacecraft construction. In order for this to be realized, the avionics computer interface must be standardized to its highest functional layers. To this end, researchers plan to modify the hardware for Goddard's Navigator spacecraft GPS receiver to include a SpaceWire application-specific integrated circuit (ASIC) that will enable standardization of the interface and compatibility with all other SpaceWire-based architectures. The researchers plan to deliver a receiver that would be ready for testing in September 2008, and for integration on NASA's planned AFRL PnP satellite technology demonstration flight to be launched one year later.

technology infusion



Recently awarded Seed Funding will help researchers understand the potential implications of near-Earth objects.



Seed Funding may help improve next-generation topography techniques.

Seed Fund recipients chosen for 2008 (continued)

Helping NASA better understand unknown planetary bodies and their potential risks to Earth

Small, primitive bodies in the solar system remain one of the least characterized aspects of our neighborhood in space. Of particular scientific significance is the internal structure of the vast, uncharted population of all primitive objects in our solar system, including cometary nuclei, asteroids, and related near-Earth objects (NEOs). Detailed 3D characterization of the shallow interior structure of primitive objects is one of the only approaches for quantifying the mechanics of impact events (including potential Earth impact) involving such objects.

To meet this need, researchers from Goddard, Penetradar Corporation, and Ohio State University will use IPP Seed Funding to develop a lightweight, low-mass, low-frequency, high-bandwidth, and high-resolution inverse synthetic aperture radar (ISAR) instrument for subsurface 3D imaging of the interior structure of critical bodies of the solar system. The instrument concept development is ideally suited for NASA reconnaissance missions to such primitive objects as part of emerging priorities within NASA's Science Mission Directorate, and is also relevant to scientific issues within Earth system science and for enabling human exploration of the Moon and Mars. In addition, the instrument can be used for NASA's NEO program to characterize asteroids and comets that could be a threat to Earth.

Improving mapping techniques for topography and NASA exploration of icy moons

With support from the Seed Fund, researchers at Goddard and Fibertek, Inc. of Herndon, VA plan to accelerate development of a next-generation mapping technology, leading to an engineered aircraft mapping lidar system by 2009. The planned innovation will be capable of mapping using multiple laser beams, building on NASA's rich heritage in laser altimeter topographic mapping. The project will help meet the Science Mission Directorate's need for new remote sensing technologies to better see, detect, and measure the Earth and the solar system and will enable high-resolution mapping of the Earth's land topography, vegetation structure, and ice sheet elevation change. The advancement will benefit several NASA missions, including the National Lidar Mapping Initiative (NLMI), Lidar Surface Topography (LIST) mission, ICESat-II mission, and planetary missions to the icy moons (Europa, Enceladus) of the outer planets. The technology will enable NASA to build instruments for these missions with greater spatial coverage and range resolution while substantially reducing the mass, size, power consumption, complexity, risk, and cost of the laser transmitter.



Astronaut safety is a key goal of a Seed Funded partnership with United Space Alliance.

Helping NASA ensure crew health and safety during hazardous space weather events

Of paramount importance to NASA space and lunar exploration missions is the health and safety of crew members. Yet current methods provide minimal real-time response and predictive capabilities for adverse space weather conditions. Such “solar particle events” can subject the crew to potentially lethal radiation doses and impair critical systems (e.g., life support, communications, power). Key data about such events must be integrated into situational awareness/mission operations tools so that timely mitigation plans can be implemented for crew, vehicles, and surface assets. To this end, researchers at Goddard and United Space Alliance (USA) are receiving Seed Funding to develop prototype software tools and spatio-temporal visualizations that will import space weather and radiation science data directly into operational tools for the pre-mission planning and real-time execution phases of exploration programs. The planned innovation will provide early identification of adverse weather events and will provide NASA’s Space Operations Mission Directorate the ability to account for such events during mission planning/scheduling as well as to react during real-time execution. This includes providing lead time to direct exploration crews to the closest radiation-hardened safe haven and implementing plans to protect lunar outpost infrastructure.

(Editor’s Note: A separate project with USA also received 2007 Seed Funding. See the story on page 8 for details.)

“I’d like to express my sincere thanks and appreciation to [the IPP Office] for your outstanding support throughout the latest IPP Seed Fund proposal preparation process. Your comments, feedback, suggested edits, etc. were highly valued and, in my opinion, significantly contributed to a terrific proposal.”

— *Stephen Talabac, Goddard Innovator*

technology infusion

innovative: Leveraging other government agencies and resources for NASA needs

The IPP Office provides opportunities for Goddard researchers to find outside sources of funding and research through other government agencies—helping Goddard achieve NASA's mission needs more efficiently and cost effectively.

Goddard civil servants and contractors can search the online Other Government Agency (OGA) Reference page on the IPP Office Web site (<http://ipp.gsfc.nasa.gov/>) to help identify relevant labs and points of contact at other government organizations. Developed in FY07, this resource enables Goddard researchers to establish relationships with government organizations for technology infusion and future funding opportunities. The document covers many technology areas, including:

- Space and near-space sensors and systems
- Strategic and tactical networks
- Informational assurance

The IPP Office's professional staff provides assistance with proposals and submissions wherever possible, often helping to pinpoint areas where the same submission materials may be used for multiple sources of funding.

Goddard and the National Cancer Institute help ensure astronaut health

One highly successful FY07 example of utilizing other government resources to infuse technology that helps address NASA needs is an agreement among Goddard, the National Cancer Institute (NCI), and the University of Maryland College Park (UMCP). This three-way memorandum of understanding (MOU) aims to develop an advanced nanobiosensor that enables fully electronic cancer mutation detection. Not only would this nanoscale field-effect transistor (nanoFET) replace the current and highly time-intensive fluorescence technique for DNA analysis, but it also would enable a miniaturized, simplified, low-power, and potentially handheld diagnostic device that could be part of a medical toolkit in space exploration missions.

The collaboration will help transfer the cancer science and engineering discovery and development ultimately to a comprehensive device whose output is the predicted diagnosis/prognosis/detection of cancer.

For astronauts and patients here on Earth, these advances are expected to enable scientists to locate biomarkers in individuals' genetic makeups to predict a susceptibility to cancer. Specific to astronauts—who are susceptible to



Astronauts in space may be better protected against adverse health phenomena thanks to joint research between Goddard, the National Cancer Institute, and the University of Maryland College Park.

radioactive damage during long space-flight missions—the technology will enable their blood to be monitored over a long period of time.

This partnership among NCI, UMCP, and NASA is just one example of how the IPP Office is helping make cross-governmental collaboration not just a possibility but a reality.

DIA and Goddard facilitate technical exchange

The IPP Office also works to put agreements in place now that anticipate NASA's future needs. A prime example of this proactive strategy is a new MOU with the U.S. Defense Intelligence Agency (DIA) that will promote cross-agency technology infusion for mutual benefit. The agreement creates a Technical Exchange Group (TEG) between the two organizations that will meet biannually with the goal of sharing new technology developments, plans, and future aerospace and defense mission needs and requirements in order to identify potential areas of technical exchange, infusion, and partnerships. As part of the agreement, the DIA will work to advocate appropriate infusion of Goddard-developed technologies throughout the defense intelligence community.

innovative: Finding infusion partnerships that directly impact NASA missions or needs

NASA missions further gained benefits gleaned from many infusion agreements with other non-NASA organizations in FY07. Contractual agreements with external organizations may be in the form of a Space Act Agreement (SAA), Cooperative Research and Development Agreement (CRADA), Interagency Agreement, or Memorandum of Understanding (MOU). Whatever form they take, these agreements are designed to directly benefit NASA mission or research needs.

The table below summarizes other infusion agreements signed in FY07. These agreements are identified as infusion because of the many benefits they offer NASA mission needs, but they also offer technology transfer benefits to partner organizations, building mutually beneficial relationships that help support complementary goals.

Company / Organization	Technology	Infusion Benefits for NASA	Missions Impacted
3 separate agreements: University of Oxford, University of California Observatories, and The Aerospace Company	Cryogenic High-Accuracy Refraction Measuring System (CHARMS) Facility	NASA will obtain new refractive index data to improve optical designs for cryogenic operation without investing research funds, and also will receive financial reimbursement for use of the facility.	All NASA missions operating at cryogenic temperatures can benefit from the measurement findings. In particular, the JWST and Kepler Photometer missions have benefited from CHARMS measurements.
Ball Aerospace	Digital Signal Processor (DSP) cluster, optics	NASA may be able to integrate Ball's algorithms into optical image processing systems for future missions.	Any future mission requiring image-processing systems may benefit.
Hampton University	Handheld Sun Photometer	The agreement meets a NASA mission need and may provide royalties if/when NASA patents the technology.	The collaboratively created photometer will benefit the CALIPSO and GLOBE projects.
LogicNets	Artificially intelligent robotic system	NASA will have the potential to define and test many important exploration scenarios using the proposed robotic test system, including exploration and monitoring of land and water surfaces as well as planetary exploration.	Any NASA planetary exploration mission may potentially benefit.
Lockheed Martin	"Navigator" GPS receiver	The work aims to reduce risk for NASA missions requiring onboard navigation using GPS in geo-stationary orbit.	GOES-R and other missions may benefit from the GPS capabilities provided.

Innovative:

finding uses for new technologies
in our own backyard — and beyond



Technology Transfer

The primary goal of the technology transfer process at Goddard is to encourage innovative, broad utilization of Goddard-developed technologies in the American industrial and academic communities as well as to facilitate Goddard's use of technologies and expertise outside of NASA. NASA has been committed to technology transfer since its founding. In fact, the concept of transferring technology out of the Agency was part of the original legislation that created NASA. One of the provisions of the National Aeronautics and Space Act of 1958 was "to provide for the widest practicable and appropriate dissemination of information concerning its activities and results thereof." Goddard's IPP Office continues to make the concept of technology transfer a consistent part of innovation within the Agency—and FY07 delivered many successes that speak to this achievement.



innovative: Meeting mutual needs and goals through Technology Transfer Agreements

The following table summarizes the technology transfer agreements signed in FY07. While these innovative agreements represent technologies and/or Goddard expertise being transferred to external organizations, most also include infusion-type benefits that will directly impact NASA needs—now or in the future.

Company/ Organization	Goddard Technology	Partner Benefits	NASA Missions Impacted
BCG Wireless	Hilbert-Huang Transform (HHT)	Competitive advantage will be achieved through HHT's capability in improving signal reception for radio frequency (RF) devices.	NASA missions utilizing radiometers, telescopes, and satellites may benefit from enhanced RF capabilities.
BAE Systems	SpaceWire Link and Switch	BAE will achieve competitive advantage through building a new computer board with native SpaceWire Link and Switch functionality.	In addition to reimbursement, NASA will be able to procure BAE's new SpaceWire-based computer board at a lower cost than building similar technology in-house or retrofitting existing computers, benefiting many missions such as JWST.
Three separate agreements: E-City Nanotechnologies, American GFM, and Nanotailor	Single-Walled Carbon Nanotube (SWCNT) manufacturing process	The companies will be able to offer high-quality SWCNTs at a very competitive price, helping to support their growing businesses.	In addition to royalty revenue, NASA can support mission needs with royalties received by the license and will be able to procure SWCNTs from the company for its own research at a low price.
Enduro Medical Technology	Cable-Compliant Joint (CCJ) Mechanism	With an expanded license, Enduro will be able to develop an equine version of its successful Secure Ambulation Module (SAM) rehabilitation walker.	While no specific missions are impacted, NASA can fund infusion efforts to benefit future missions with royalties received from the license.
Emergent Space Technologies, Inc.	Goddard's Formation-Flying Test Bed GPS Test and Simulation Facility	Emergent saves start-up and development costs by using NASA's facilities rather than investing the large amount of capital required to develop comparable facilities.	Facility usage fees paid will help maintain the facility to ensure availability for future NASA mission needs.
U.S. Department of Energy	Burst Alert Telescope (BAT) engineering test unit	The agreement allows for testing of BAT's effectiveness in detecting Gamma-rays in homeland security applications.	The agreement will support future proposals for work in optimizing the technology specifically for homeland security operations.
SEGMA, LLC	KAELO Software	Collaboration will be directed toward applying an intelligent robotic system to an automated corporate governance rating system, enabling SEGMA to use NASA expertise in building a business intelligence tool.	In addition to reimbursement, NASA can apply lessons learned to the Exploration Technology Development Program, helping researchers understand the roles of autonomous systems on the Moon.



innovative: A personal route to a two-way street

The U.S. Congress and the NASA Administrator have placed great emphasis on transferring NASA-developed technology and expertise to U.S. industry to increase U.S. industrial competitiveness, create jobs, and improve the balance of trade. But technology transfer is not a one-way street. The IPP Office at Goddard actively seeks innovative agreements that transfer technology to valued partner organizations, while also yielding infusion benefits to

meet NASA mission needs. The IPP Office innovates by taking a personal, hands-on approach to such agreements by assigning each potential partner a Technology Transfer Manager who can help all parties determine the best type of agreement to meet the needs of both organizations through mutually agreeable terms, timelines, and logistics. The results? Highly efficient innovation for NASA and for our partners.

innovative: Learning from the past to look toward the future

The IPP Office is always seeking to improve processes, strengthen relationships, and foster the continued success of established technology transfer agreements. In looking to the future, we evaluate the successes of past years to determine strategies to ensure that Goddard continues to be a Technology Partner of Choice.

Finding novel approaches to international agreements

While international agreements provide a great opportunity to gain global cooperation in achieving NASA's vision for space exploration, they also present distinct challenges due to their unique requirements compared with domestic agreements. For example, international agreements require that at least 50% of the product or technology in question be manufactured in the U.S. This requirement may automatically disqualify some potential agreements that would involve technologies built abroad. Because of this, an unfortunate status quo of assuming that "it just can't be done" often prevents international agreements from even being considered within some organizations, says the IPP Office's Ted Mecum. "At Goddard's IPP Office, we don't want to assume these agreements are just impossible. We want to understand the requirements of the agreement

and very clearly understand the international guidelines. Then we can make intelligent choices about whether the agreement makes sense and how to make it happen."

The IPP Office has handled one international agreement through to signing in FY07 and is managing a second agreement in negotiations. Both agreements involve Goddard's Cryogenic High Accuracy Refraction Measurement System (CHARMS) facility, enabling the IPP Office to meet international agreement requirements because the technology in question involved testing at a NASA (domestic) facility. By very clearly understanding the guidelines for international agreements, the IPP Office is making inroads in identifying innovative approaches to international agreements. Moving forward, the IPP Office is developing best practices surrounding international agreements—helping to turn challenges into opportunities for innovation.

The IPP Office is working to strengthen *past* partnerships, build strong relationships in the *present*, and improve processes moving into the *future*.



innovative: Finding multiple avenues for single innovations

The IPP Office strives to find as many avenues of technology transfer as possible for each Goddard innovation. In FY07, several technologies were the subject of multiple success stories due to broad applicability of the innovation; support and enthusiasm from innovators who took active roles in the technology transfer and partnering processes; and diligent, aggressive work from IPP Office staff who cultivated multiple partner relationships.

Goddard's SpaceWire implementation sparks industry-wide interest

FY07 brought with it several technology transfer agreements related to Goddard's Link and Switch implementation of the international SpaceWire protocol, which is a set of serial links that describe a space computer network used to transfer information defined in packets. Developed by innovator Glenn Rakow, Goddard's Link and Switch provides several additional features that improve the reliability and usability of the SpaceWire standard for space-flight applications. Researchers and IPP Office staff knew that it would generate much interest in the aerospace community if they could make information about the innovation widely available. Their efforts began in 2006 when they developed a strategy to make the technology available free of charge via Software Usage Agreements (SUAs). As a result, nearly every major U.S.

aerospace company in the U.S. has evaluated Goddard's technology. And three major corporations—Aeroflex,



The SpaceWire Link & Switch promises to advance and streamline electronics systems across the aerospace industry.

Harris, and BAE Systems—all signed reimbursable Space Act Agreements (SAAs) in FY06 or 07, soliciting Goddard's expertise in integrating the technology into their avionics electronic products. Their products will contain native SpaceWire functionality, giving them a competitive edge, while NASA missions will benefit from the increased availability of SpaceWire-based electronics. Finally, the aerospace industry as a whole will benefit from the

increased acceptance of the SpaceWire standard, which provides for compatibility and efficient reuse of avionics components—saving all aerospace organizations valuable time and resources.

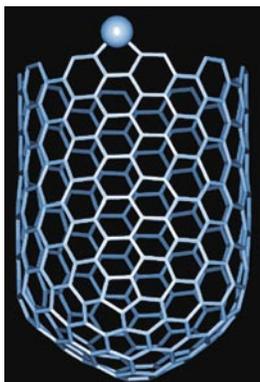
“The more companies we can work with to integrate SpaceWire into more aerospace applications, the better for NASA, for the SpaceWire protocol, and for the industry overall.”

—Ted Mecum, NASA Goddard's Innovative Partnerships Program Office



Patented nanotechnology supports multiple new businesses

Although carbon nanotubes were discovered 15 years ago, their use has been limited due to the complex, dangerous, and expensive methods required for their production. However, Goddard scientists developed a simpler, safer, and much less expensive manufacturing process for single-walled carbon nanotubes (SWCNTs). The key innovation in this process was its ability to produce bundles of SWCNTs without using a metal catalyst, dramatically reducing pre- and post-production costs while generating higher yields and greater purity.



Goddard's process for manufacturing SWCNTs (pictured) is spurring interest among many nanotechnology companies.

These significant benefits caught the attention of several small and growing nanotechnology companies in FY07. “By bringing costs down while pushing quality up, we

can help the industry increase adoption of this valuable technology,” said Ramon Perales, president of Nanotailor, Inc.—one of three companies that licensed Goddard’s SWCNT manufacturing process this year. Like Nanotailor, the other two companies—E-City Nanotechnologies and American GFM—licensed the technology to take advantage of the competitive differentiation that Goddard’s method offers. These three licenses are added to the license signed in FY06 with Idaho Space Materials, bringing the SWCNT manufacturing process license count to four. And as more companies begin developing high-quality, affordable SWCNTs, industries ranging from medical to microelectronics will benefit from increased availability of this important nanotechnology.

“By bringing costs down while pushing quality up, we can help the industry increase adoption of this valuable technology.”

— Ramon Perales, President, Nanotailor, Inc.



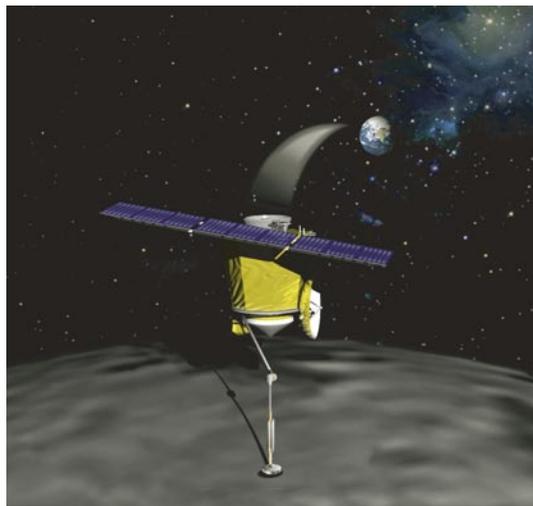
innovative: Maintaining strong relationships to yield ongoing technology transfer successes

Seeking new partnerships and negotiating multiple agreements for Goddard technologies are important components of an overall strategy of increasing the value of our innovations within and beyond the space program. Another important component is the continued nurturing of successful relationships in order to yield repeat agreements or successes now and in the future. The IPP Office's personal approach to technology transfer agreements enables many partnerships to grow over time with continued benefits for both NASA and our partners.

designAmerica and Commercial ASIST—an important and continuing tech transfer success story

During the 1990s, designAmerica participated with Goddard in the development of the Advanced System for Integration and Spacecraft Test (ASIST) technology. ASIST is a real-time command and control system for spacecraft development, integration, and operations. designAmerica licensed ASIST from Goddard in October 2003, making it available as a commercial off-the-shelf (COTS) product.

Today, ASIST has become the ground system of choice for successful satellite and instrument projects. Building on the dedication and hard work of the designAmerica team and the foresight and support of Goddard's IPP Office throughout the licensing process, ASIST is well on its way to becoming the commercial success that was originally envisioned in its early days. For example, Northrop Grumman has chosen designAmerica and ASIST to be its basic rapid development component for its in-house project flight software development and avionics integration and test labs. This work benefits a range of satellites that the company is developing in-house, including NASA



ASIST will be both the development and the operations system for the RQ36 asteroid-rendezvous Discovery mission OSIRIS (pictured).

missions such as the Lunar Crater Observation and Sensing Satellite (LCROSS). With ASIST at the core of its development suite, Northrop Grumman has demonstrated impressive gains in automated development and testing. In this way, they have streamlined satellite development, and saved substantial mission dollars.

In addition, designAmerica and ASIST were recently selected by Lockheed Martin to be the in-house integration and test (I&T) and mission operations system at its satellite production facility in Denver. For this project, ASIST

will be both the development and the operations system for the RQ36 asteroid-rendezvous Discovery mission OSIRIS and the Mars Atmosphere and Volatile Evolution (MAVEN) mission for NASA, with a demonstrated cost savings of well over \$3M for the ground system element.

NASA's licensing efforts and its continued interest in the designAmerica relationship is clearly reaping benefits and success for both organizations today—almost five years after the initial license was signed.

(Editor's Note: Sections of this story were adapted from text written by Thomas J. Green, president, designAmerica.)



From human to animal rehabilitation: a long-term prognosis for the strength of the Enduro relationship

What began as hinge technology for robots and sounding rockets used in the space program has become a revolutionary rehabilitative device with a growing list of applications—thanks to the strength of the relationship between Goddard’s IPP Office and Enduro Medical Technology.



SAM (pictured) helps patients with a variety of injuries and diseases relearn to walk and perform physical therapy exercises.

In the 1980s, NASA required a technology that would facilitate mechanical isolation of sounding rocket assemblies as well as provide compliance for robots to grip or join objects. As part of this robotics research, the late James Kerley developed the cable-compliant joint (CCJ) technology, which provided customizable structural connections and selective, subtle cushioning, twisting, and alignment in six directions, allowing contact surfaces to be joined together.

Not only did the technology meet NASA’s requirements, but it was readily clear that the subtle movement the technology facilitated could easily be extended to other applications. In the 1990s, researchers at Goddard integrated the CCJ technology into a patented walker that supports the pelvis and provides compliance that

imitates hip joint movement. In 2003, Goddard licensed the technology to Enduro, which used the CCJ to develop the Secure Ambulation Mode (SAM) walker. The SAM rehabilitative devices have shown remarkable success, all documented and promoted by the IPP Office through Web feature articles, printed success stories, support at NASA events, and press releases.



SAM-Equine is now being tested for use in horse rehabilitation.

After establishing the device’s use and benefits for human rehabilitation, Enduro engineers engaged in discussions with doctors at nationally renowned veterinary hospitals. Interest among this community was high and convinced Enduro that the CCJ-based technology could also be incorporated into a rehabilitative device designed specifically for horses. Having kept in close contact with the IPP Office, Enduro found a second license agreement to be a natural extension of an already-strong relationship. So in February 2007, Enduro secured a new field-of-use license from Goddard to develop SAM-Equine. The company has developed a prototype of an equine version, and is currently testing the device on live horses.

“We’re already seeing tremendous success using SAM for physical therapy with humans. Now with SAM-Equine, we’re looking at one of the biggest advancements to date in horse medicine and rehabilitation.”

— Ken Messier, President, Enduro Medical Technology

Innovative:

supporting and protecting our
most valuable assets



Intellectual Property Management

Using best practices in intellectual property (IP) management, Goddard's IPP Office is helping to increase the value of Goddard technologies within and beyond NASA. IP management is a crucial component of the innovative partnerships picture, helping to:

- Promote Goddard technologies throughout other NASA Centers, industry, academia, and other government organizations
- Increase the value of Goddard's IP through the identification of applications for Goddard innovations beyond the space program
- Protect Goddard's financial and IP interest through the diligent procurement of patent and copyright protection for Goddard innovations
- Strengthen Goddard's strategic position through activities that highlight our technological capabilities and enhance our innovative reputation

These goals resulted in considerable accomplishments in FY07, with many successes in IP protection, awards, patents, new technology metrics, and more.

intellectual property management

innovative: Encouraging new technology reporting to assess it, protect it, and promote it

The IPP Office works hard to help increase the value of Goddard's IP through a variety of activities. But we rely on Goddard innovators to report new technologies so that these valuable activities can be set in motion. Through NASA's invention disclosure form (NASA Form 1679), innovators can identify and document new innovations. Once a New Technology Report (NTR) has been submitted, the IPP Office assigns each innovation a Technology Transfer Manager who makes plans to:

- Review the technology in order to identify applications within and beyond NASA
- Work with a Goddard patent attorney to secure the appropriate patent, copyright, or other IP protection
- Identify potential partners and develop marketing plans and strategies to increase awareness of the technology in a manner that protects Goddard's interests



eNTRe provides an online method of reporting new technologies.

Reaching out to innovators: Door to door, training, publications, and more

In FY07, the IPP Office began a strong push to encourage increased filing of NTRs in order to strengthen the value of more Goddard technologies than ever. Through a door-to-door approach, IPP Office staff members extended guidance and encouragement in person to help innovators understand the value of technology reporting and to answer any questions about the process. They also encouraged use of the online technology reporting system, eNTRe (<http://entre.nasa.gov>), to streamline the reporting process for increased efficiency.



The Tech Transfer Training course gives civil servants, contractors, and program/project managers critical information about the partnering process.

In addition to the door-to-door approach, the IPP Office has expanded its Tech Transfer Training course. Innovators can attend the in-person training at Goddard held once per quarter. In addition, a course specifically covering the ins and outs of software reporting has been added. Looking forward, the IPP Office also plans to host training sessions at Wallops as well.

innovative: Recognizing innovator efforts in tech transfer with the James Kerley Award

Named for an innovator and teacher with a 32-year tenure at Goddard and an exceptional commitment to technology transfer, the annual James Kerley Award recognizes a Goddard innovator with outstanding support for technology transfer and new technology reporting.

(Editor's Note: Read the story about Kerley's CCJ technology continuing to revolutionize rehabilitation with SAM on page 21.)



Glenn Rakow

This year, the award was given to Glenn Rakow for his work related to the SpaceWire protocol for data transmission in flight electronics. “Mr. Rakow was a natural choice as NASA’s SpaceWire Representative. But he has taken that role far beyond expectations,” said former Goddard Deputy Director Mike Ryschkewitsch, who presented Rakow with the award at the IPP Office’s annual NTR Program. “Mr. Rakow has worked extensively with the IPP Office to help get his innovative SpaceWire-based designs and his expertise into industry.... His commitment to technology transfer is clear: from filing NTRs for several technologies to identifying industry partners to supporting more than five Space Act Agreements.” The IPP Office congratulates Glenn Rakow on his extraordinary efforts to help further technology transfer at Goddard.

(Editor's Note: Find more information about Goddard's SpaceWire agreements for FY07 on page 18.)

“Working with the IPP Office has ... helped us gain a lot of exposure that we might not otherwise have gotten, through various stories, press releases, events, and just general publicity about what Goddard is doing with SpaceWire. Those efforts have definitely been extremely helpful. As an innovator, half the battle is won through education and communication, and the IPP Office is great at facilitating both. They help ‘grease the skids’ in a lot of respects and help our efforts gain more credibility both within and outside of NASA.”

— Glenn Rakow, Goddard Innovator

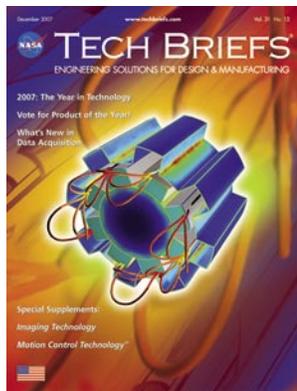


innovative: Promoting technologies and partnerships through publications and media

Complementary to the training and NTR reporting efforts, the IPP Office has established high-quality, valuable publications and media to promote new technologies both within and beyond NASA, as well as to showcase the value and outcomes of new and ongoing partnerships. These publications and media take the form of:

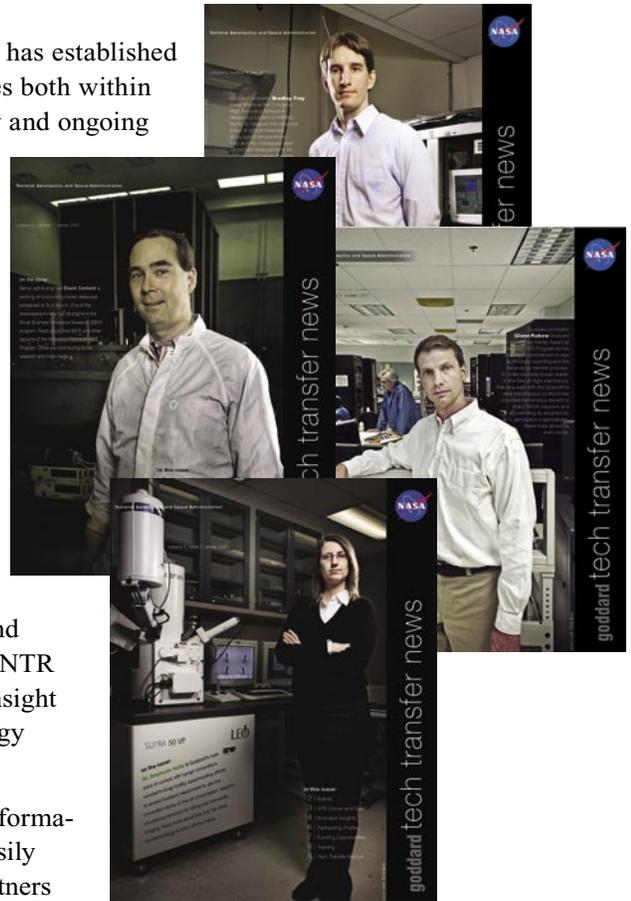


Table tents in the Goddard and Wallops cafeterias highlight technology and partnership news.



IPP Office stories often appear in publications such as Goddard View and NASA Tech Briefs.

- *Goddard Tech Transfer News*, the IPP Office's quarterly magazine, which showcases notable innovators, newly reported technologies, awards, events, and more
- Table tents placed in the Goddard and Wallops cafeterias, highlighting the value of reporting technologies, facts about the technology transfer process, advice from innovators, and more
- Regular articles appearing in *Goddard View*, highlighting recent partnerships and notable technologies, as well as the new NTR Quiz, which offers Goddard personnel insight into the facts behind Goddard's technology transfer process
- The IPP and OGA Web sites, offering information about key Goddard technologies, easily accessed and searchable by potential partners looking for innovations that meet their needs
- Partnership success stories, available in print and on the IPP Web site, showcasing infusion and technology transfer partnerships
- Press releases written by the IPP Office and issued by Goddard's Public Affairs Office, which have gained national media coverage for Goddard technologies
- Technology submissions to the monthly publication *NASA Tech Briefs*



Goddard Tech Transfer News is published quarterly and features notable innovators, partnership news, awards, events, and more.

innovative: Gaining recognition and prestige for Goddard and its IP through awards

Awards play an important part of the IPP Office's strategy to recognize and promote the value of Goddard's IP, helping the agency gain credibility as a Technology Partner of Choice. The IPP Office provides Goddard innovators support for award nominations and application processes. FY07 was a very successful year for awards at Goddard.

Goddard technology receives an R&D 100 Award

Called the "Oscars of invention" by the *Chicago Tribune*, this annual award from *R&D Magazine* recognizes the 100 most innovative and technologically significant new products on the market. For the second year in a row, a Goddard technology has received an R&D 100 Award—this time for the Adaptive Sensor Fleet (ASF) technology.



Jeff Hosler (pictured here with colleague Troy Ames) manipulates a rover on Goddard's MERS terrain using the award-winning ASF technology. John Moisan (not pictured) is also part of the innovation team behind ASF.

The revolutionary ASF software architecture employs a unique, simple interface to remotely control vehicles (such as boats, satellites, rovers, robots, etc.) to work collaboratively in support of many scientific goals. The technology has already made significant inroads into oceanographic and simulated planetary research—and its breadth of capabilities has the potential to benefit science missions ranging from oil-spill detection to search-and-rescue operations.

Goddard technology named Nano 50 Award winner

Goddard's "Method for Manufacturing High-Quality Carbon Nanotubes" has been named a winner in the third annual Nano 50 Awards in the technology category.



Innovator Jeannette Benavides accepted the Nano 50 Award on Goddard's behalf.

Presented by *Nanotech Briefs* magazine—the monthly digital publication from the publishers of *NASA Tech Briefs*—the Nano 50 recognizes the top 50 technologies, products, and innovators that have significantly impacted, or are expected to impact, the state of the art in nanotechnology. The winners of the Nano 50 Awards are the "best of the best"—the innovative people and designs that will move nanotechnology into key mainstream markets. This technology has gained much recognition in FY07 not only through awards, but also through three license agreements.

(Editor's Note: For more information about this award-winning technology, see the story on page 19.)

intellectual property management

innovative: Attending events to strengthen the value of Goddard technologies

IPP Office staff and Goddard innovators attended a large number of events in FY07, helping to further the message that Goddard is a Technology Partner of Choice. Attendance at aerospace and other industry events, technology showcases, and symposia offers the opportunity to communicate this message to potential partners and collaborators, to receive valuable feedback from peers, and to learn about new ideas and new technologies that may benefit NASA mission needs.



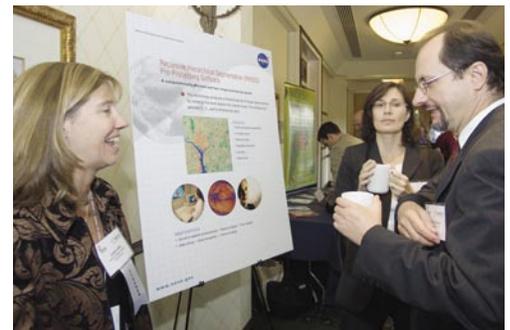
“The IAC provides us an ideal opportunity to identify partners to meet NASA infusion needs, to network with potential future collaborators and to learn new business processes and tactics.”

—Nona Cheeks, referring to the 2007 International Astronautical Congress, one of many events attended by IPP Office staff in FY07.

Goddard researchers Julia Loftis and Jeff Hosler attended the National Space Symposium in Colorado.



Ted Mecum (left) and Bill Saettel (from Glenn's IPP Office) talk with an attendee at Sensors World.



Goddard's IPP Office presented 12 technologies at the TEDCO showcase.

The following table summarizes the IPP Office's participation in events in FY07, as well as successful outcomes.

Event, Location, Dates	Description	Outcomes
58th International Astronautical Congress (IAC), September 24-28, 2007, Hyderabad, India	Hosted by the Indian Space Research Organisation (ISRO) and Astronautical Society of India (ASI), the event's theme was "Touching Humanity: Space for Improving Quality of Life." The week-long event hosted space professionals, journalists, and students from all areas of the globe.	IPP Office Chief Nona Cheeks co-chaired a session entitled, "Innovating through Technology: Spin-In and Spin-Off." The session provided a global perspective on best practices for technology transfer and the facilitation of innovative partnerships.
MIT Enterprise Forum's (MITEF's) 3rd annual Technology Transfer Lab, May 22, 2007 Arlington, VA	Focused on the hottest mobile technologies from university and federal labs throughout Maryland and Virginia, this year's event offered technologists an opportunity to receive valuable critiques, suggestions, and comments to help further the commercial viability of their innovations. It also offered the MITEF audience (which included venture capitalists, private investors, local companies, and entrepreneurs) exposure to new, cutting-edge technologies coming out of area labs.	Goddard innovator Stephanie Getty was one of only six innovators selected by MITEF to present at the event. Her patent-pending NanoCompass technology—a lightweight, low-power magnetometer—was well-received by the panel of experts who provided Getty with feedback related to cost-competitiveness, finding approachable markets, and narrowing applications.
Society for the Advancement of Material and Process Engineering (SAMPE) 2007 Conference, June 3-7, 2007 Baltimore, MD	This annual event boasted nearly 300 exhibitors and was attended by nearly 4,000 members of the materials science community.	IPP Director Douglas Comstock was invited to present the keynote address, highlighting the role of the IPP and technology transfer partnerships in achieving NASA's strategic goals. Goddard innovators Stephanie Getty and Betsy Pugel were also invited to present information about their technologies.
2nd Annual NASA Day on the Hill, June 20, 2007 Capitol Hill, Washington, D.C.	The all-day event was open to members of Congress, their staff, and the general public and featured interactive exhibits, targeted handouts, and speakers and staff from across the Agency to educate attendees and the press about current NASA operations and the importance of NASA to local communities.	The IPP Office was the only mission support office invited to share the day with the Mission Directorates. The IPP presented a memorable and popular display highlighting the importance of pursuing partnerships with the emerging commercial space sector and demonstrating how NASA's research today will affect life tomorrow. As a result of this success, the IPP has been invited to be a part of future Day on the Hill events.
NASA Goddard Space Flight Center Technology Partnering Opportunities Showcase, October 12, 2006, Greenbelt, MD	More than 200 representatives of companies, universities, and government organizations from around the corner and around the world attended this showcase to find out how Goddard's latest innovations could help advance their own R&D, public services, or commercial product lines. The event was made possible by a partnership agreement signed in FY06 between Goddard and the Maryland Technology Development Corporation (TEDCO).	The showcase featured presentations on a dozen technologies and two state-of-the-art facilities by leading Goddard researchers. The long-term success of the event is hinted at in the many leads for potential partnerships between Goddard and showcase attendees. IPP is working with Goddard researchers to develop these leads into successful partnerships.

intellectual property management

innovative: Finding novel approaches to extend Goddard's innovations further

In late 2007, the IPP Office began discussions regarding license agreements for multiple technologies with Ocean Tomo, an IP consulting firm that exposes technologies to the marketplace through live IP auctions. At press time, the company was in the process of evaluating several Goddard technologies for possible license and subsequent auction.

The IPP Office is interested in this innovative approach to marketing technologies as a means to efficiently and effectively gain broader market exposure in an historically insulated IP market where transactions have been conducted privately, with no public discussion with respect to buyers, sellers, or price. "The single biggest advantage of this potential licensing deal with Ocean Tomo is that we will be able to gain more value from NASA technologies that have not been successfully licensed in the traditional sense but still have a tremendous amount of value," said Bryan Geurts, chief patent counsel for Goddard. "Through this auctioning process we're able to leverage an innovative way of bringing these technologies into the stream of commerce." According to Ocean Tomo, IP owners such as Goddard benefit from the live auction format by capitalizing on the press garnered by the auction itself, an established centralized marketplace, and a competitive bidding environment.

If the license agreements with Ocean Tomo prove successful, Goddard will likely continue an ongoing partnership well into the future, says Geurts. "I absolutely see a bright future for making this a part of our day-to-day tech transfer process."



An anticipated agreement will enable live IP auctions of promising Goddard technologies.

"Through this auctioning process we're able to leverage an innovative way of bringing these technologies into the stream of commerce."

– Bryan Geurts, Goddard Chief Patent Counsel

Patent Applications Filed

Blocking Contacts for N-Type Cadmium Zinc Telluride

Conformal Gripper

Dual Order Common Path Spectrometer

Flexure Based Linear and Rotary Bearings

Instrument and Method For X-Ray Diffraction, Fluorescence, and Crystal Texture Analysis Without Sample Preparation

Method and Associated Apparatus for Capturing, Servicing, and De-Orbiting Earth Satellites Using Robotics (four applications)

Microsphere Fiber Laser System

Miniaturized Double Latching Solenoid Valve

Nanowire Device and Method of Making a Nanowire Device

Otoacoustic Protection in Biologically-Inspired Systems

Polarization-Preserving Waveguide Filter and Transformer

Robotic Arm with Compact High Power Joint Technology

Specular Coatings for Composite Structures

Strain-based Carbon Nanotube Magnetometer

System and Method for Determining Stability of a Neural System

Systems and Method for Delivery of Information

Systems, Methods and Apparatus for D-Dimensional Formulation and Implementation of Recursive Hierarchical Segmentation

Systems, Methods, and Apparatus of a Low Conductance Silicon Micro-leak for Mass Spectrometer Inlet

Provisional Patent Applications Filed

Airborne Lidar for National Lidar Mapping Initiative

Analog Radio Interference Suppression System

Directed Flux Motor Utilizing Concentric Magnets and Interwoven Flux Channels

Extreme Ultraviolet (EUV) Detectors Based Upon Aluminum Nitride (AlN) Wide Bandgap Semiconductors

Field Reactive Amplification Controlling Total Adhesion Loading (FRACTAL)

Improved, Flexure-Based Linear Bearing

Low Conductance Silicon Micro-leak for Mass Spectrometer Inlet

Magnetorheological Fluid-Based Conformal Gripper

Method for Non-Destructive Evaluation of Thermal Protection

System Materials and Other Materials via Ultraviolet Spectroscopy

Space Operations Learning Center Web Site

Systems, Methods, and Apparatus of a Space Communication File Transfer System

Patents Received

U.S. Patent No. 7,145,739: Lightweight Optical Mirrors Formed in Single Crystal Substrate

U.S. Patent No. 7,240,879: Method and Associated Apparatus for Capturing, Servicing, and De-Orbiting Earth Satellites Using Robotics

U.S. Patent No. 7,207,245: Screw-Locking Wrench

U.S. Patent No. 7,255,483: Thrust Rollers



Innovative:

getting involved in a good thing



*Goddard is your Technology Partner of Choice.
Let the IPP Office help you make the connection.*

Goddard Innovators

Have you developed a new technology? Do you have ideas for a collaborative research project you'd like to get underway? Get involved with the IPP to protect and promote your technologies, find sources of funding and partners for future research and more. Contact us to get started today:

301.286.5810

techtransfer@gsfc.nasa.gov

Goddard Program/Project Managers

Are you interested in finding new sources of funding for ongoing or future mission research and needs? Do you have contacts in other organizations and businesses with whom you'd like to partner? We can help you get the ball rolling. Contact us today to learn more:

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techtransfer@gsfc.nasa.gov

Potential Partners

Are you interested in learning more about NASA Goddard technologies to see if they may be useful to your organization? Perhaps you've developed a technology or have a research idea in mind that may meet NASA mission needs? Learn more about our technologies by visiting our Web site:

<http://ipp.gsfc.nasa.gov/>

Or contact us today to talk about how we can work together:

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