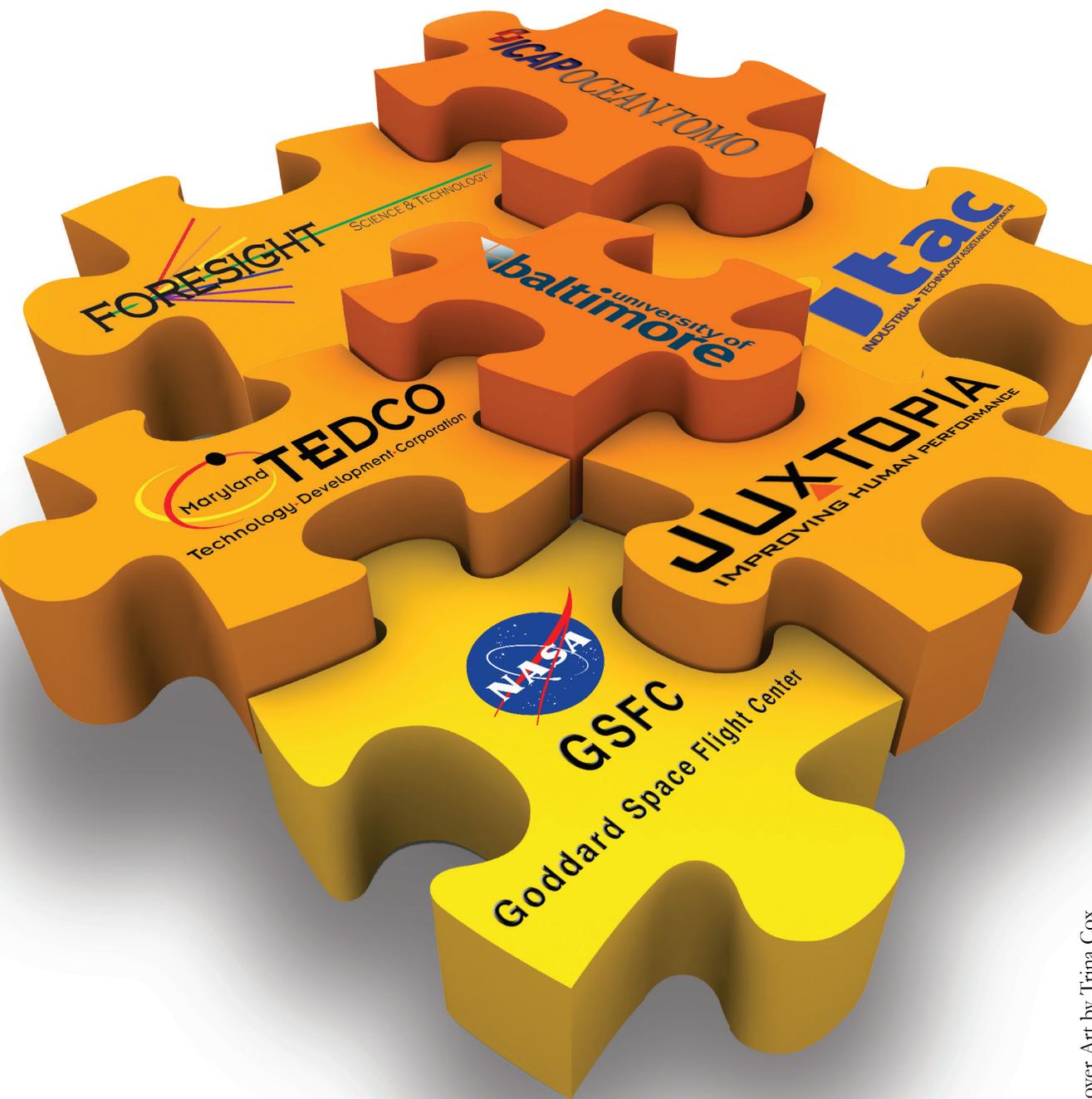


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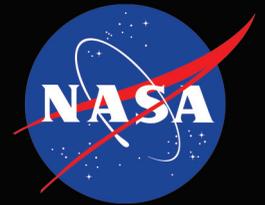
## Putting The Pieces Together in Partnerships



Cover Art by Trina Cox

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GSFC NEWS

# tech transfer

The central theme of this issue of *Goddard Tech Transfer News* is about working with intermediaries to bridge collaborative opportunities with the public and private sectors. We highlight partnerships we have in place with diverse organizations that are responsible for advancing technology development and application to support high tech economic development. These articles describe the roles and objectives of the intermediaries, and how NASA Goddard leverages them to target collaborative opportunities for technology transfer, licensing and R&D projects.

For example, Maryland's Technology Economic Development Corporation (TEDCO) is partially funded by the state and is primarily responsible for high tech business development by working closely with federal labs to identify technologies for transfer and partnering opportunities. Another intermediary with whom we collaborate is New York's Industrial Technology Assistance Corporation (ITAC). ITAC is also partially funded by its home state to help foster new partnerships and technology based business development opportunities. Our partnership with Juxtopia, LLC is designed to help facilitate new opportunities for small high tech business and working with tier 2 and tier 3 colleges and universities on technology transfer applications. The University of Baltimore involves MBA students performing assessments of NASA Goddard patented technologies and developing a prospectus for applications and markets for new commercial NASA Goddard inventions. In addition, Foresight Science & Technology provides NASA Goddard support in identifying potential partners within other government agencies and global areas of relevant interest. We also have partnered with ICAP Ocean Tomo to help facilitate our technology transfer efforts via their unique intellectual property transaction platforms.

We trust you will find this issue of *Goddard Tech Transfer News* resourceful for how the NASA Goddard IPPO can support your partnering interest and needs. If you have any questions about partnering with NASA Goddard, or would like to learn more about NASA Goddard technologies in general, please feel free to contact the Innovative Partnerships Program Office at [techtransfer@gsfc.nasa.gov](mailto:techtransfer@gsfc.nasa.gov).

Nona Cheeks  
Chief, Innovative Partnerships Program Office  
NASA's Goddard Space Flight Center



Nona Cheeks



## Intermediaries Used to Facilitate Partnerships

*Dennis Small, Technology Transfer Manager with the Innovative Partnerships Program Office, offers his views on collaborating with intermediaries to form partnerships.*

I have spent over 25 years at NASA in the area of Ground System Implementation. Formerly, I was the Mission Operation Implementation Manager for the Fermi Gamma-ray Space Telescope mission, which explores the most extreme environments in the universe; where nature harnesses energies far beyond anything possible on Earth. The Fermi Gamma-ray Space Telescope mission also searches for evidence of new laws of physics, as well as data that may help scientists understand the nature and composition of the mysterious dark matter.

Currently, I am working on a detail in the Innovative Partnerships Program Office (IPPO) as a technology transfer manager. I am having a great time working in the IPPO, learning about and understanding the processes involved in developing partnerships and commercializing NASA Goddard technologies. My responsibilities include identifying, reviewing, and evaluating new and innovative technologies for potential patenting and/or licensing consideration. I also have the role of negotiating partnerships between NASA and private industry, academia, and/or other government organizations. I have an excellent opportunity to help define and participate in industry outreach activities about technology transfer practices and outcomes.

As a technology transfer manager, I have had the chance to meet business leaders and talk about the broad range of technologies available for licensing at NASA Goddard. This falls in line with the October 2011 Presidential Memorandum: Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Businesses. The interest here is to establish and foster innovation by increasing the rate of technology transfer from federally funded research and development (R&D), which in turn provides economic and societal benefits that fuel economic growth.

Since joining the IPPO team, I have been tasked with targeting and subsequently negotiating agreements with intermediaries – organizations the NASA Goddard IPPO could work with to leverage technology transfer opportunities. These agreements allow NASA to work with various organizations within their respective geographical regions and/or technical capabilities.

To discuss how to utilize one of NASA Goddard's intermediaries to help identify potential partners, please contact Dennis Small (phone: 301-286-7960, email: [dennis.a.small@nasa.gov](mailto:dennis.a.small@nasa.gov)).



**Dennis A. Small**

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Years with NASA: **26**

Education: **MS Technical Management, Johns Hopkins University; BS Applied and Computational Mathematics, Bowie State University**



# NASA Goddard Space Flight Center's IPPO and Partnering with NASA Goddard

Throughout this issue of *Goddard Tech Transfer News*, the theme is collaboration and partnering with NASA Goddard Space Flight Center. Featured are types of partnerships, how and why partnerships are formed, examples and success stories. Collaboration has always been an important component of NASA Goddard's technology strategy. And in these days of tight budgets and limited resources, it will continue to grow in importance as a means to enhance NASA Goddard's expertise and technology base and to leverage existing capabilities.

Guiding this collaboration effort is the NASA Goddard Innovative Partnerships Program Office (IPPO). The Office manages the licensing and partnering of NASA Goddard's intellectual property (IP) portfolio. The IPPO works with industry, academia, and other government agencies to identify partnership opportunities and to construct partnership agreements to help advance new technology designs and developments with mutual interest.

## Identifying Partnership Needs

In determining partnership needs, the IPPO reviews the requirements of the primary NASA Goddard science focus areas, including Exploration Systems, Communication and Navigation Systems, Planetary and Lunar Science, Astrophysics, Heliophysics, and Earth Science. The IPPO then matches these requirements against NASA Goddard's technology focus areas. Any gaps between the two -- for instance, an Earth Science requirement that cannot be met by a current NASA Goddard technology or capability represents a potential partnership opportunity.

The following chart is a graphical representation of this process:

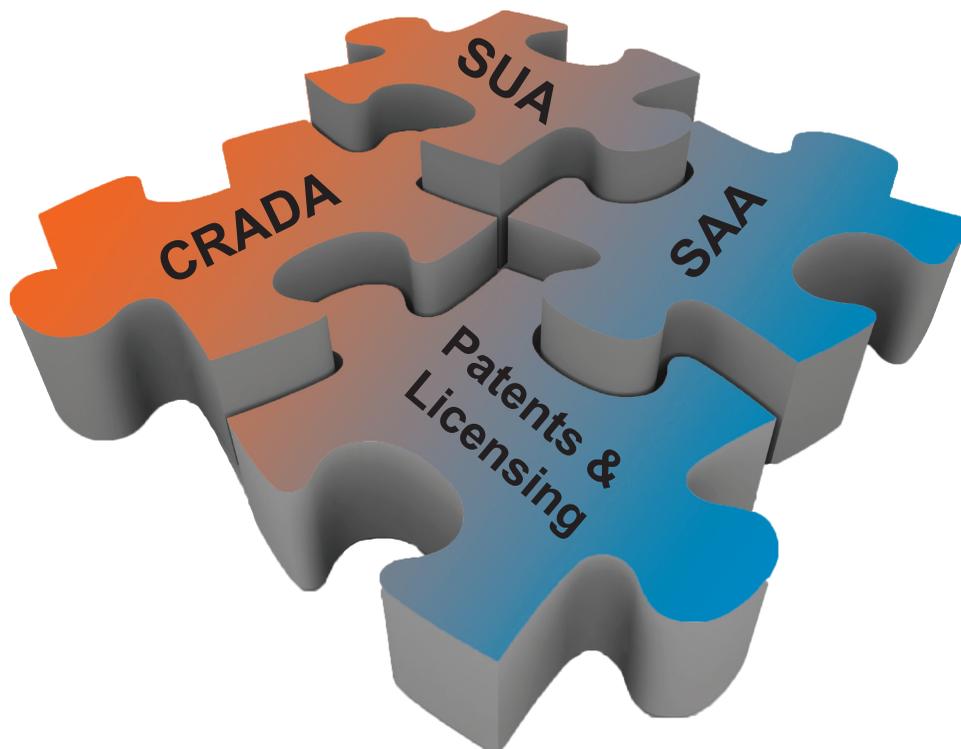
## Types of Partnership Agreements

There are several legal instruments available for partnership

agreements, as shown in the table on the following page:

Briefly, these partnership agreements function as follows:

- Cooperative Agreement Grant is for funding activities that serve a public purpose. These activities may or may not include direct NASA involvement. These agreements are usually competed, and NASA funding is available.
- Cooperative Research and Development Agreement (CRADA) is designed for leveraging research efforts that allow jointly owned IP. Specific research and development objectives and goals are required. A CRADA is not competed, and no NASA funding is available.
- Patent/Copyright License is for transferring specific rights of NASA IP for specific commercial use. It is royalty-based. A Patent/Copyright License is not competed, and no NASA funding is available.
- Software Usage Agreement (SUA) provides access to NASA developed software. It is subject to export control, IT security, copyright restrictions, and compliance, it has several categories of release for government and R&D uses. It is not competed, and no NASA funding is available.
- Space Act Agreement (SAA) is designed for collaborations with the public and private sectors. It is subject to U.S. statutory code(s) and NASA requirements. NASA funding is sometimes available. The Space Act Agreement is described in more detail in a separate article in this issue of *Goddard Tech Transfer News*.



	Cooperative Agreement Grant	CRADA	Patent/ Copyright License	Software Usage Agreement (SUA)	Space Act Agreement (SAA)
<b>Purpose</b>	NASA funding provided to facilitate activities that accomplish a public purpose	Used by NASA for cooperative research and development that allows IP rights up front.	Transfer specific rights associated with NASA-owned Intellectual Property	Access to NASA developed software	Collaborations with the public and private sector
<b>Competition Required?</b>	Yes	No	Yes	No	In some circumstances
<b>Notable Requirements</b>	<ul style="list-style-type: none"> <li>• Public purpose</li> <li>• NASA may be involved</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborative research and development</li> </ul>	<ul style="list-style-type: none"> <li>• Intellectual Property</li> <li>• Royalty-based</li> <li>• Commercialization</li> </ul>	<ul style="list-style-type: none"> <li>• Export control compliance</li> </ul>	<ul style="list-style-type: none"> <li>• Subject to statutory and NASA requirements</li> </ul>
<b>Authority</b>	Space Act; 31 USC 6304; 31 USC 6305	15 USC 37210a	35 USC 207	NASA Policy Document 2210.1C	Space Act of 1958

Table 1: Example of Partnership Mechanisms.



# Partnering with NASA Goddard Space Flight Center

We've talked a lot about partnering and collaboration in this issue of *Goddard Tech Transfer News*. In this article, we look at the six-step process for identifying a NASA Goddard technology need, and then developing a partnership to fulfill that need.

## Step 1: Identify Technology Needs

The NASA Goddard Innovative Partnerships Program Office (IPPO) begins by identifying the technical challenges and needs for NASA Goddard to support its missions. Part of this process involves interviewing technologists and project leaders, key personnel who are leading NASA Goddard's strategic technology efforts. We then match our needs with potential sources of solutions external to NASA.

## Step 2: Prioritize the Needs

At any given time, NASA Goddard has many technological needs. Therefore the IPPO usually must prioritize which of these needs are the most essential and time-critical. To do this, the IPPO considers several parameters that speak to the need's importance, urgency, and applicability within NASA. Another key parameter is how clearly the need is defined, an important consideration for helping potential partners understand the requirement and accurately judge whether or not a match exists.

The IPPO works closely with a team of project leads to discuss overall strategic technical focus. The IPPO then reviews other parameters, such as whether or not viable partners exist, whether non-NASA applications exist for the technology, and so on.

## Step 3: Strategize How to Best Address the Need

Before starting the search for a partner, the IPPO considers several questions that will guide the partnering strategy:

- Does the needed technology already exist?
- Is it likely that a partner can be found in other government agencies?
- What types of contacts should be targeted within a given organization and how should they be approached?
- What contacts does the IPPO already have that can be leveraged?
- What industry experts exist that can accelerate progress?
- What types of outreach/marketing materials (print and/or electronic) will be required to convey the need to potential partners?

In seeking partners, the IPPO typically works closely with NASA Goddard's assistant chiefs for technology to identify organizations that could complement NASA Goddard's strengths. The IPPO also reviews market studies, patent activity, publications, and relevant industry meetings, identifying several potential partners. They then develop a strategy for approaching these organizations with the partnership opportunity.

## Step 4: Finding Potential Partners

Once the strategy for securing a partner is defined, the IPPO "markets" the opportunity to potential partners. This effort includes distributing materials that describe the need with detail

and clarity, to facilitate discussions with potential partners. These materials also include information about relevant NASA technology available for licensing, or about other NASA capabilities that might be of interest.

## Step 5: Secure the Partnership Agreement

Once the best partner candidates have been identified, the IPPO works with NASA Goddard technologists and the potential partner to define the partnership agreement. This involves identifying the best legal agreement instrument (such as a Space Act Agreement) and negotiating mutually beneficial terms for that agreement.

## Step 6: Observing and Promote the Agreement

The signing of the partnership agreements does not end IPPO's role in partnership development. Observing and promoting the partnership will likely result in a more successful partnership for both parties. And as new technologies emerge from the partnership, the IPPO helps manage intellectual property. In addition, the IPPO notifies partners when new relevant funding opportunities are announced that could support an expansion and/or future continuation of the project, benefiting both NASA and its partner.

For more information about the NASA Goddard partnering process, please visit <http://ipp.gsfc.nasa.gov/partnering.shtm>, or contact the IPPO at:

Innovative Partnerships Program Office  
 NASA Goddard Space Flight Center  
 Code 504  
 Greenbelt, MD 20771  
 (301) 286-5810  
[TechTransfer@gsfc.nasa.gov](mailto:TechTransfer@gsfc.nasa.gov)



# The Space Act Agreement: A Quick Review

As we noted elsewhere in this issue of *Goddard Tech Transfer News*, there are a number of legal instruments available for forming a partnership between NASA Goddard and another entity. Among the more commonly used ways to partner with NASA is the Space Act Agreement (SAA).

## The Space Act Agreement Defined

Designed for collaborations with the public and private sectors, the SAA is a flexible instrument that traces its origin back to the National Aeronautics and Space Act of 1958. The Space Act authorizes NASA centers

“...to enter into and perform such contracts, leases, cooperative agreements, or other transactions as may be necessary in the conduct of its work and on such terms as it may deem appropriate, with any agency or instrumentality of the United States, or with any State, Territory, or possession, or with any political subdivision thereof, or with any person, firm, association, corporation, or educational institution.”

The purpose of a Space Act Agreement is to define a set of legally enforceable promises between NASA and its partner. A Space Act Agreement is required whenever a partnership entails a commitment of NASA resources involving an entity other than NASA. This generally involves a commitment of NASA resources, such as equipment, expertise, facilities, or technologies, for example, to fulfill the objectives of the agreement.

Over the years, NASA Goddard has formed a very large number of partnerships through the use of Space Act Agreements. These partners have come from a broad spectrum of companies, organizations, individuals, and other entities. These agreements have helped accelerate R&D activities; introduced new R&D processes and technologies; and have leveraged resources for addressing common goals.

## Types of Space Act Agreements

Space Act Agreements are often categorized in accordance with the type of entity (public or private) with which NASA is partnering. They vary in types as outlined below.

- **Reimbursable**, which provide for payment of NASA's costs by the partnering party. A reimbursable agreement permits a public or private entity to use NASA facilities, personnel expertise, or equipment to advance mutual interests.
- **Non-reimbursable**, which requires both NASA and its partner to each bear the cost of the project. Non-reimbursable agreements are appropriate in situations where NASA and its partner perform activities in cooperation, for which each party is particularly suited, and for which the intended results are of interest to both NASA and its partner.
- **Funded**, in which NASA provides funding to its partner. Funded agreements are used very rarely, in cases where the stated purposes of the agreement cannot be achieved through any other type of Space Act Agreement.

## Space Act Agreement Format

Each agreement must clearly state the reason(s) that the partnership is required. This includes an explanation of the fundamental objectives of the partnership, description of the purpose and scope of the project and role of responsibilities for each party.

NASA guidelines advise that all agreements should be structured in a way that guarantees fairness and consistency. This will help ensure that all NASA partners can expect a certain measure of uniformity when entering into an agreement with any NASA Center. In addition, general rules and standards guiding governmental ethics should of course apply to all Space Act Agreements.

For more information about the NASA Goddard partnering process, please visit <http://ipp.gsfc.nasa.gov/partnering.shtm>, or contact the IPPPO at:

Innovative Partnerships Program Office  
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# NASA Goddard Partners to Advance Manufacturing

Traditionally, the manufacturing sector has been one of the foundations of the American economy. According to the National Association of Manufacturers, manufacturing accounts for over 18 million jobs in the U.S., with more than \$500 billion in payroll annually. For U.S. manufacturers to remain competitive in the modern global economy, they will need to continue to develop and implement new technologies that provide maximum productivity and efficiency.

NASA Goddard's IPPO is mindful of the needs of the manufacturing industry, and actively seeks opportunities to collaborate with manufacturers. This often takes the form of leveraging NASA Goddard technologies developed for space and science applications and making them available to manufacturing companies, to improve their production capabilities. In many instances, this involves collaboration with organizations that directly serve specific industrial segments. These organizations can in turn help match each NASA Goddard technology with companies who have the greatest potential application and need for it. One example of such an organization is the Industrial Technology Assistance Corporation (ITAC), based in New York City, a metropolitan area with a manufacturing payroll that exceeds \$18 billion annually according to U.S. Census Bureau data.

## “Manufacturing Friendly” NASA Goddard Technologies

There are numerous examples of NASA Goddard technologies that offer significant potential to manufacturers. Two obvious examples are control software and robotics. Industrial robots are typically used in manufacturing processes. Common tasks for these devices include welding, cutting, lifting, sorting, and bending.

NASA Goddard engineers and scientists have developed many software technologies designed to control robots and ensure they perform at peak efficiency. Others are intended to allow robots to act with more autonomy, making decisions based on the demands of the dynamic environments in which they operate. These software technologies have significant commercial potential for terrestrial robotic applications.

For instance, automated code generation technology (GSC-15148-1) developed at NASA Goddard allows a non-programmer to issue instructions to a robot through informal input such as natural language or graphics. The code generation algorithm then converts this informal input into a formal mathematical language, which in turn is used to generate actual code. This allows robotic processes to be set up more quickly, for example to manufacture a limited run of specially modified units.

ITAC is a 25 year old not-for-profit organization that has a goal is to “strengthen the economy of New York City by improving the performance of small to mid-size firms that create or produce technical and manufactured products.” ITAC helps identify companies who may have a use for these technologies, and helps them establish contact with NASA Goddard. According to Franklin Madison, Jr., technology program director at ITAC, NASA Goddard has developed a number of technologies that could be “extraordinarily useful” to the manufacturing businesses.

In a typical scenario, ITAC approaches companies and provides them with information about NASA Goddard technologies ITAC believes could be of use to their product needs. Helping this process is the fact that the NASA brand has a “certain cachet in industry, with a long history of commercializing the technologies they’ve developed over the years.”

## Partnering with NASA Goddard

NASA Goddard and ITAC's partnership serves as a good example of how the IPPO collaborates with other organizations to connect with potential partners in diverse industry sectors. According to Mr. Madison, NASA Goddard technologies offer numerous opportunities for ITAC's client companies and businesses across the New York region. These opportunities extend across the board, into many different types of markets and businesses, including a number of potential high growth technologies. He also has high praise for the IPPO itself. “They're a joy to work with! They're willing to listen and be collaborative, which makes things very easy for us.”

Mr. Madison also has some advice for companies who may be contemplating a partnership with NASA Goddard, especially in regards to being prepared. He notes that the IPPO web site (see <http://ipp.gsfc.nasa.gov/>) is very extensive, with a great deal of information about many available NASA Goddard technologies. Before contacting NASA Goddard, a company should review this site and learn more about what's available and how it could help them do business. His final piece of advice is to “call NASA Goddard's IPPO. If you have a question about a particular technology, just contact them directly; they're generally good at providing answers. It's important to understand that NASA isn't a static entity; they're changing constantly. So if you want to keep up, be ready to reach out to them.”

## Takeaways

NASA Goddard Space Flight Center has developed a number of technologies that offer significant potential value to the manufacturing sector. These include electronic and mechanical devices and the software that controls them. NASA Goddard's IPPO is actively collaborating with organizations to help match NASA Goddard technologies with potential partners in manufacturing. One example of this is Industrial Technology Assistance Corporation (ITAC), based in New York City.



<http://www.itac.org>

# Collaborating to Capture

NASA Goddard Space Flight Center actively seeks the best possible companies with which to partner. This often involves working with organizations that can help match NASA Goddard technologies and capabilities with start-ups and small industry. Such efforts help ensure that NASA Goddard has the broadest and most innovative candidates from which to choose for forming partnerships.

## Reaching Out for Technology Transfer Applications

Juxtopia is working with NASA Goddard under a partnership agreement to help promote space entrepreneurship opportunities for small industry; startups and tier 2 and tier 3 colleges and universities. Juxtopia hosts outreach programs to help these entities understand NASA's Technology Transfer charter, resources to be leveraged, and the NASA technology portfolio of intellectual property available for transfer.

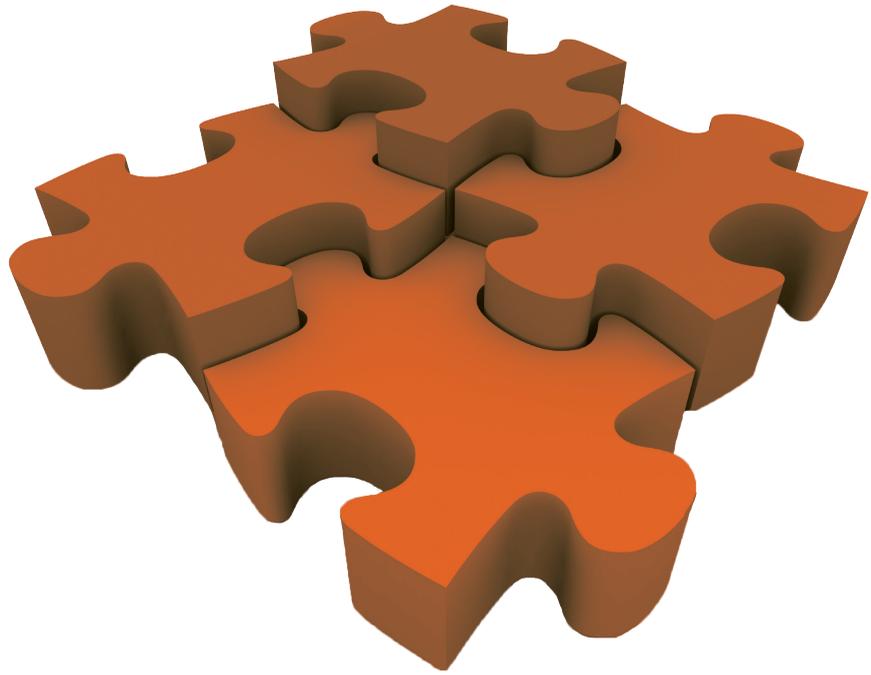
Dr. Jayfus Doswell, founder and board chairperson of the Juxtopia Group, Inc., cites a recent example of collaboration between NASA Goddard and Juxtopia. "A company approached us and said they wanted to develop an advanced modality to train tennis players," explains Dr. Doswell. "Juxtopia worked with the company to sketch out the concept on paper, defining its subsystems in the process. We then contacted NASA Goddard and asked, 'What do you have on your technology shelf that can be used to satisfy these subsystems' requirements?' This approach can help a company by significantly decreasing the time and cost required to develop a product. We can also identify NASA Goddard technologies that may be licensed and integrated into target systems, technologies that the company might otherwise have to develop on their own, from scratch. Subsequent prototyping was considered. Working with NASA Goddard in this fashion can really accelerate time to market and decrease overall product development costs."

## Juxtopia: Commitment to Hi-Tech Urban Enterprise

Juxtopia serves as another good example of working with an organization that has a targeted client base in need of technical solutions. Through interactions with NASA, Juxtopia's technology came to the attention of the IPPO. In turn, Juxtopia talks with scientists from NASA Goddard, NASA Glenn, and Johnson Space Center about potential applications. According to Dr. Doswell, the partnership with NASA Goddard elevated exposure and access to "a lot of great technology for utilization well beyond NASA's original uses."

## Partnering with NASA Goddard

Dr. Doswell speaks highly of his experiences collaborating with the NASA Goddard IPPO, particularly with their commitment to meet with companies on-site. "They've come to Baltimore



to meet with companies and learn of their needs first hand," he states, "and they're very timely when we need information," he says.

"It's also interesting to reflect on what we've learned about NASA during this time," adds Dr. Doswell. "Originally, we viewed NASA as simply the U.S. space agency. What we now realize is that they also represent the best collection of scientists and technologists in the Nation, and they own all kinds of applicable space and Earth science-based intellectual property -- they're like a real-life 'Warehouse 13'! They also offer excellent prototyping capabilities, which is especially important in helping start ups and many small hi-tech firms. Further, NASA Goddard has the expertise at hand to help accelerate time-to-market -- a critical factor in business success."

## Takeaways

NASA Goddard is actively interested in partnering with companies from historically under-represented and disadvantaged communities. This often involves collaborating with organizations and other entities dedicated to promoting business opportunities within these communities. One example of this is the Juxtopia® Urban Innovation and Cooperative Entrepreneurship (JUICE) Network, a group designed to help minority-owned companies understand how they can benefit from collaborating with NASA Goddard.



<http://www.juxtopia.org>

## Partnering with Small Businesses

Over the years, NASA Goddard Space Flight Center has formed strategic partnerships with a number of companies. These include some of the most prominent technology corporations in the industry. Less well-known may be the fact that NASA Goddard also actively seeks to form partnerships with smaller companies, including start-ups. These new, smaller companies are often appropriate for collaborations involving the commercialization of NASA Goddard-developed technologies originally intended to support NASA missions.

### Small Business and NASA Goddard

Small businesses often make excellent commercialization targets for NASA Goddard technologies, particularly those ideally suited for specialized niche markets and applications. Larger companies may have limited interest in pursuing a technology for which the revenue opportunity is relative relatively modest. A smaller firm, on the other hand, may consider such a technology quite attractive, and thus be very interested with partnering with NASA Goddard to further develop and productize the technology.

One example of this type of collaboration involves Mobitrum Corporation, an innovator in the development of high speed, long distance free space optics for line of sight optical bandwidth connections. Mobitrum received funding to support a collaborative project with NASA Goddard that began in 2004. They have since won numerous SBIR awards from NASA for advanced smart-sensor technology adaptive RF transceiver development. The system, which supports NASA's space exploration programs, combines laser and wireless technologies that are automatically adjusted to compensate for the normal weather degradation of other optical line of sight solutions.

Mobitrum plans to further develop and test their technology in collaboration with NASA Goddard, to enhance the current design toward achieving market potential. This technology may also be a benefit to NASA Goddard for their mobile campaigns; therefore NASA Goddard is also providing testing, development, and other resources. The goal of the collaboration between NASA Goddard and Mobitrum is to make design and material enhancements to the current prototype and to have NASA Goddard conduct field and laboratory tests and provide a system evaluation report.

### TEDCO

To reach small companies such as Mobitrum requires a multi-faceted strategy involving a variety of venues and approaches. One of these approaches is to collaborate with organizations dedicated to the promotion and development of small technology businesses in a particular state or region. For instance, the Maryland Technology Development Corporation (TEDCO) provided the funding that allowed Mobitrum to partner with NASA Goddard. According to Ronald Kaese, Director of Federal Programs for TEDCO, the Corporation is an economic development arm of Maryland, focused on technology-based economic development. TEDCO, which has a Space Act Agreement with NASA Goddard, looks for small businesses interested in partnering with NASA Goddard. This can involve a patent licensing deal, or other forms of collaboration. TEDCO can also provide third-party financing to help support these partnerships through funding programs.

As Mr. Kaese explains, "A small business owner may walk in our door and say 'I'm doing such-and-such, how can you help me?' Perhaps

they need access to an anechoic chamber for development and testing a piece of hardware. Or maybe they need software. At that point, we may tell them 'Let's talk to Goddard' and see whether or not there may be the potential for a mutually beneficial relationship there." TEDCO has also conducted and promoted several technology showcases for NASA Goddard, to help ensure interested parties show up at these events. This includes small and large businesses, as well as other government agencies.

### The Benefits of Partnering with NASA Goddard

Mr. Kaese cites NASA Goddard's unique facilities, expertise, technologies, and data sets as especially valuable to small businesses. "For instance, suppose a startup software developer has an algorithm that they believe can analyze terabytes of data faster, cheaper, and better than anything else out there. They might develop a simulation that they can run on a laptop. Potential investors and customers looking at the simulation will say 'that's nice, but can it work in the real world and can it scale up?' To address this, the developer can partner with NASA Goddard, and run the algorithm on the Center's supercomputing facilities, using huge amounts of data that has been analyzed before. If successful, they get results from NASA Goddard in a report that says how it was tested and that the algorithm works in a real-life setting. This allows the developer to move further up the economic food chain and helps maximize their chances of success."

NASA Goddard also provides market intelligence that helps collaborators identify potential partners for their technologies. Recently TEDCO was involved in a technology showcase for NASA Goddard, helping to promote their wavefront sensing technologies. "To help us ensure we approached the right companies and organizations to get them to attend," says Mr. Kaese, "the IPPO provided us with a number of market assessment reports that discussed various aspects of potential markets for wavefront sensing. This included identifying which market niches would likely be interested in which technologies. This made it easy for us to match up a specific potential partner with a specific technology, and ensure that the technology would be one in which the companies would likely have high interest. These reports removed a lot of the guesswork from the process."

### Takeaways

NASA Goddard is interested in partnering with industry, academia, and other government agencies. In many cases, small businesses make ideal partners for coming up with innovative solutions of their own or NASA IP for respective needs. The same is true for partnering with academia; other government organizations like NASA Goddard are looking for leveraging capabilities and strategically work closer for mutual needs. In pursuing these partnerships, NASA Goddard relies on the partnership with Maryland Tedco to attract the right organizations for select partnering interest.



<http://www.marylandtedco.org>

# Partners in Partnering: NASA Goddard and Foresight Science & Technology

A major theme within NASA Goddard is how to continue to enhance our expertise and technology base (and leverage existing capabilities) in the most efficient, innovative, and cost-effective ways. A critical component of this effort is through partnerships, to leverage NASA Goddard's R&D activities and facilities, to accelerate R&D work, and to bring in new technologies and expertise. These partnerships can be with other NASA centers, other government agencies, academia, or private enterprise.

Foresight Science & Technology is assisting the IPPO with its technology partnership efforts. Foresight (founded in 1980) is dedicated to "stimulating innovation and the uptake of new technologies in the United States and around the world." Customers include over 145 companies (ranging from the Fortune 100 to start-ups), over 80 universities and foundations, and over 40 government agencies and laboratories. A major focus is to facilitate technology transfer, product development, and commercialization decisions and challenges.

Foresight's collaboration with NASA Goddard takes several forms, including:

- Industry outreach programs, in which Foresight helps NASA Goddard showcase and highlight technologies and areas of expertise to potential commercialization partners

in targeted industry segments. These programs are designed to help promote NASA Goddard technologies, and bring them to the attention of private companies and others who may be interested in developing these technologies into commercial products and businesses.

- Assessment reports that review the viability of potential markets and applications for specific NASA Goddard technologies. These assessments help identify the most promising potential markets for each available technology.
- Periodic magazines and other publications that highlight the latest developments and partnership opportunities at NASA Goddard. Each magazine and article focuses upon a particular area of interest within the NASA Goddard IP portfolio.

## Takeaways

NASA Goddard Space Flight Center offers numerous partnership opportunities for technologies that, with a little creativity, could be leveraged into new uses in a broad spectrum of potential markets. Foresight Science & Technology assists NASA Goddard in identifying these partnership opportunities.



<http://www.foresightst.com>

## Auctioning NASA Goddard Patents

The NASA Goddard IPPO constantly seeks new and innovative ways to promote and gain exposure for NASA Goddard Space Flight Center's intellectual property (IP) portfolio. One way to do this is through patent auctions, in which IP is made available to the public and commercial entities bid for the right to license them. The auction venue helps provide a sense of urgency and closure to IP transactions, and offers a way for the open market to set the value of IP.

NASA Goddard has formed a contingency-based partnership with ICAP Ocean Tomo, a recognized pioneer and leader in the live auctioning of intellectual property assets. ICAP Ocean Tomo's Live IP Auction has become the premier live public

forum for the open and public exchange of IP. In addition, semi-annual regional auctions are held across the U.S.

These auctions provide valuable exposure to NASA Goddard patents, and also comprise a broad source of potential licensees. The auctions help satisfy NASA Goddard's requirement to disseminate information about technical achievements, and promote the use of NASA-sponsored technology development for uses beyond NASA.



## NASA Goddard Technologies Go to Business School

When it comes to commercializing NASA Goddard technologies, all perspectives are welcome, even those who may not yet have gathered a great deal of hands-on business experience in industry. To take advantage of this fact, NASA Goddard is collaborating with the University of Baltimore's Merrick School of Business to analyze and consider the commercial potential for a variety of NASA Goddard technologies. In this program, MBA candidates are presented with a number of NASA Goddard technologies. The students then devise potential applications and markets for these technologies.

NASA Goddard scientists and engineers will work directly with University of Baltimore faculty and MBA students to provide them with detailed information about their inventions. The goal is to equip the students with sufficient technical background about the invention and its capabilities to define potential new uses for it. In return, NASA Goddard will receive formal reports, assessments, and commercialization plans from the University. Potential partnerships between NASA Goddard and the University will also be explored. If the resultant proposed product meets certain expectations for commercialization, further work on it will be conducted by the students and faculty in cooperation with NASA Goddard.

According to Enidia Santiago-Arce of the Innovative Partnerships Program Office, the collaboration with the University of Baltimore includes some unusual aspects. "We often work with consultants to find potential applications for our inventions," explains Ms. Santiago-Arce, "but usually it's to determine whether or not it's worth pursuing IP protection for the invention. Our program with the University involves technologies we've already patented, we already know they have commercial value. What the students provide us are all kinds of new ideas for how these technologies could be used and turned into products. They look at each technology from different perspectives, and suggest applications and markets we might never have thought up on our own. We frequently encourage our innovators to think 'out of the box.' These students practically define 'out of the box' thinking!"

One recent example involved a gear bearing technology developed by Dr. John Vranish. "These bearings were originally developed for light robotic applications" states Ms. Santiago-Arce. "The students looked at the technology, and decided it could offer potential in an entirely new market -- wind-powered electricity generation systems. We hadn't even considered this possibility." Note that this could be a very timely suggestion -- recently, the U.S. Federal Energy Regulatory Commission (FERC)

conditionally approved the Atlantic Wind Connection, a \$5 billion project (which includes internet search giant Google as a major investor) to create an offshore transmission line that would connect up to 6,000 MW of offshore wind power to the US east coast, from Virginia to New Jersey. This may present significant market opportunities for improved wind power technologies. (For more information about Dr. Vranish's gear bearings, see [http://ipp.gsfc.nasa.gov/ft\\_tech\\_gear\\_bearings.shtm](http://ipp.gsfc.nasa.gov/ft_tech_gear_bearings.shtm).)

Thus far, the response from NASA Goddard engineers and scientists has been positive. "The innovators enjoy working with the students, and are an active part of the process" says Ms. Santiago-Arce. And as with all effective collaborations, both partners benefit from this program. "The students get a lot of cutting edge technologies around which to build real-world commercialization scenarios, work that might eventually lead to actual product development. In return, NASA Goddard gets a lot of new ideas for creative applications for our technologies -- and in some cases, possible new licensing opportunities." Ms. Santiago-Arce also reports that NASA Goddard has pursued similar programs in the past with other educational institutions in the state of Maryland, including the University of Maryland Baltimore County, and Howard County Community College.

For additional information about the collaboration between NASA Goddard and the University of Baltimore Merrick School of Business, contact Enidia Santiago-Arce (phone: 301-286-8497, email: [enidia.santiago-arce@nasa.gov](mailto:enidia.santiago-arce@nasa.gov)).



<http://www.ubalt.edu>



## Patenting Perspectives

*In this edition of Patenting Perspectives, we discuss IP issues associated with technologies developed through various forms of collaboration with the U.S. government. Of special interest are situations in which NASA Goddard (or another publicly funded entity) develops a technology in conjunction with a partner from private industry.*

*Offering their perspectives on this topic are attorneys Bryan Geurts (Chief Patent Counsel for NASA Goddard's Office of Patent Counsel) and Erika Arner (Partner for the law firm Finnegan, Henderson, Farabow, Garrett & Dunner).*



Bryan Geurts

### Why does the government do collaborative research?

**Bryan:** Collaboration offers mutual benefits to both the government and its development partners. From a technology point of view, it's often easier to develop something when you combine assets. And it also helps fulfill the governmental mandate to share technology developed at the taxpayers' expense.

Collaborations with companies can help get these technologies out there into private industry.



Erika Arner

**Erika:** Another benefit of this type of collaboration is that more publically funded technologies can get implemented and shared with the public. Although the government conducts a great deal of research, there is very little incentive for an agency to commercialize it.

Collaboration creates more opportunities for businesses to partner with the government, and to develop products based on the results of that partnership.

### How does licensing apply in situations where NASA Goddard partners with another entity to create an invention?

**Bryan:** In my 10 years of experience working with NASA Goddard, I have observed that the traditional licensing model is becoming increasingly antiquated and immobile, and doesn't always fit anymore, especially in comparison with other collaboration models. NASA high technology development tends to be complicated. There's usually a gap between the developmental stage where NASA Goddard uses the technology, and where the technology needs to be to be a commercial product. Licensing doesn't really do much to bridge this gap. As a consequence, we've seen traditional licensing as a means for collaborative development declining in recent years, being replaced by other models.

There are two models that offer viable options to licensing. One is a CRADA, a Cooperative Research and Development Agreement, which is available to any federal laboratory. Another is a Space Act Agreement, which of course applies specifically to NASA.

### What should a business keep in mind when collaborating with the government on research?

**Erika:** Usually, when the government funds the conception of a technology or its reduction to practice, it has rights to that technology. So when partnering, companies should look for ways for any privately-funded work to be separated out from the work

funded by the government, to avoid giving away the rights to their work.

### If the government retains the rights to a technology developed in collaboration, wouldn't that eliminate them as a potential customer for that technology?

**Bryan:** Not necessarily. The government will often pay to enter a collaboration agreement with the understanding they will purchase the resulting product. In many cases, the government agency represents the first, best, and sometimes only customer for the technology, often paying a premium for it as a result.

### Has the recent Stanford-Roche Supreme Court decision had an impact on IP rights?

**Erika:** It has, but it wasn't the blockbuster some expected it to be. To put the case in perspective, it's useful to understand the Bayh-Dole Act, which basically covers IP that results from publicly funded research. In the Stanford-Roche case the inventor, who was working for Stanford, signed an agreement that gave the IP rights to a third party. Stanford argued that under Bayh-Dole it had the right to override this agreement because the inventor's work was funded by a government grant to Stanford. The Supreme Court didn't agree; they reaffirmed the concept that inventions are fundamentally owned by inventors. This gives the inventor IP rights that cannot be overruled by Bayh-Dole.

This should be considered a warning to universities and companies that receive government funding: monitor the actions of your inventors, and make sure you're not losing the rights to your IP.

### How well does the Bayh-Dole Act work in general?

**Bryan:** It's still basically a good idea, although it could be shored up in some areas. For example, Bayh-Dole allows for a two-year window in which the government can elect to retain title to the invention. The clock doesn't start ticking on this two-year period until the NTR [New Technology Report] is turned in, which is too often late in the development cycle. This can be a disadvantage to potential partners, since it means they can't obtain the rights to this IP from the government in a timely manner.

In my opinion, this two-year window should start from the date the invention is originally conceived.

**Erika:** I agree that in general Bayh-Dole benefits both the government and its partners. From the contractor's perspective, a stricter interpretation of the two-year window might provide more certainty to the process, but it could limit the opportunity for contractors to obtain IP rights from the government. Still, this is a relatively minor issue legislatively. In the big picture, Bayh-Dole works well.

## Business Networking and Outreach

### 19th Annual New Technology Reporting Program

(November 8, 2011, Newton White Mansion, Mitchellville, MD)

The Innovative Partnerships Program Office (IPPO) hosted NASA Goddard's 19th Annual New Technology Reporting Program which recognizes innovators who actively support and participate in NASA Goddard's new technology reporting and technology transfer efforts. NASA Goddard Center Management presented patent awards to innovators and the 2011 James Kerley Award to Winner, Dan Smith. The Kerley Award is presented to the individual who has demonstrated outstanding leadership in participating in technology transfer activities in the past year. This annual event acknowledges the importance in technology transfer and the benefits of partnering with industry for commercial applications of NASA Goddard technologies.



*Deputy Center Director for Science and Technology, Christyl Johnson, and Software Engineering Division Chief, John Donohue, present Dan Smith (center) with the 2011 James Kerley Award.*

networking and outreach



*19th Annual New Technology Reporting Program Keynote Speaker, Stephen Hammers, of The Hammers Company, Inc., discusses his company's technology transfer experience and outcome.*

### Journeys in Engineering, Technology, and Science

(December 3, 2011, Rockville, MD)

The IPPO participated in the Journeys in Engineering, Technology, and Science (JETS) event held at the Universities at Shady Grove on December 3rd, in Rockville, MD. This annual event offers a day of hands-on science education for hundreds of middle school students along with activities and presentations while relating the material to the Montgomery County Public Schools science curriculum. The IPPO supported the event with an exhibit promoting the NASA OPTIMUS PRIME Spinoff Video Contest, NASA's massively multiplayer online game Moonbase Alpha, and the NASA @ Home and City website, demonstrating how NASA technology evolves into products that are used throughout our daily lives.

## Business Networking and Outreach

### 2011 Maryland TEDCO Entrepreneur Expo (November 14, 2011, Baltimore, MD)

The IPPO participated in the 2011 Maryland TEDCO Entrepreneur Expo held on November 14, 2011, in Baltimore, MD. The theme of the Expo was “Harnessing the Power of Innovation in Maryland.” The IPPO hosted an exhibit in the Federal Labs pavillion and highlighted NASA Goddard’s opportunities in Technology Transfer, SBIR/STTR programs and Partnering. The Expo was the first state-wide large-scale conference dedicated to promoting and celebrating Maryland’s entrepreneurs, the key to its innovation economy.



*IPPO Technology Manager Dennis Small, talks with an attendee at the 2011 Maryland TEDCO Entrepreneur Expo.*



*Science fiction writers from Tor-Forge books visited NASA Goddard for a two day workshop to meet with scientists and engineers, tour labs and facilities, and discuss incorporating real world technologies into works of science fiction.*

### Science Fiction Meets Science Fact (November 30 – December 1, 2011, Greenbelt, MD)

NASA and Tor-Forge Books have joined forces to help raise awareness and enhance interest in the study of science, technology, engineering, and mathematics (STEM) and how NASA technologies impact the quality of life. Tor-Forge authors visited NASA Goddard in the fall for a 2-day workshop entitled “Science Fiction meets Science Fact.” During this two day event authors had the chance to tour NASA Goddard facilities and labs and meet with NASA scientist and engineers to discuss concepts pertinent to the current and future work of NASA.

### 49th Annual R&D 100 Awards Ceremony (October 13, 2011, Orlando, FL)

The IPPO participated in the 49th Annual R&D 100 Conference in Orlando, FL. NASA Goddard Space Flight Center received the R&D 100 award in conjunction with our partners at Bartron Medical Imaging, a biotechnology medical device manufacturer with Software Development and Research & Design facilities in Maryland, and Manufacturing facilities in New Haven, CT. Bartron’s flagship product, MED-SEG™, an FDA cleared medical device incorporates algorithms originally developed by NASA Goddard Earth Scientist, Dr. James Tilton.

### Wavefront and Adaptive Optics Industry Day (November 3, 2011, Greenbelt, MD)

The “Can you See it Now?” Campaign, Wavefront and Adaptive Optics Technology Briefing Workshop was held on Thursday, November 3rd, 2011 at the NASA Goddard Space Flight Center. This workshop focused on technology performance to facilitate further discussions for licensing and partnering with industry. By opening NASA Goddard’s doors to Industry, attendees were given a rare chance to take a closer look at NASA Goddard’s facilities and labs, as well as participate in one-on-one talks with scientists and engineers. This event allowed both parties face-to-face time and served as the starting point for a long term relationship between NASA Goddard and the private sector.



*IPPO Senior Technology Manager, Ted Mecum, addresses companies in Detroit, MI at the NASA Partnerships Forum sponsored by the Michigan Economic Development Corp., and the Detroit Regional Chamber.*

## **Detroit Regional Chamber Economic Development** (December 6, 2011, Detroit, MI)

IPPO Senior Technology Manager Ted Mecum co-coordinated, along with Langley Research Center and Glenn Research Center, an economic development workshop in Detroit. It was hosted by the Detroit Regional Chamber and the Michigan Economic Development Corp. to introduce Michigan High Tech companies to NASA for potential partnerships and collaborative research opportunities. NASA Goddard representatives consisting of Terry Doiron, Ted Mecum and Tom Bagg, met with over 27 companies whose capabilities included: sensors and detectors, specialty composites and structures, Li Ion batteries, flight and ground software systems, MEM electronics, optics and optical coatings and machining, cyber security and data management systems, and polycrystalline ceramic filters. Several companies were identified for further follow-up discussions/meetings with NASA Goddard technologists. NASA's participation was acknowledged by both State Senator Patrick Colbeck and US Senator Carl Levin.

## **United States Patent and Trademark Office Expo** (October 14-15, 2011, Alexandria, VA)

The IPPO hosted an exhibit at the 2011 United States Patent and Trademark Office (USPTO) Expo in Alexandria, Virginia. The IPPO talked to the public about NASA's OPTIMUS PRIME Spinoff Contest and the unique partnership between NASA and Hasbro Inc. which allows NASA the use of Hasbro's trademarked OPTIMUS PRIME and TRANSFORMERS intellectual property. The IPPO also demonstrated how NASA technology is used in our daily lives through the NASA @ Home and City website. The USPTO Trademark Expo is designed to educate the public about the value of trademarks in the global marketplace. This year's Expo attracted over 15,000 visitors of all ages and highlighted such themes as "Unusual Trademarks" and "Brand Evolution." The Expo featured educational workshops for adults and children, exhibits of authentic and counterfeit goods, and costumed characters.



*IPPO Senior Technology Manager, Darryl Mitchell, speaks with an attendee at the 2011 US Patent and Trademark Office Expo.*



*NASA Goddard IPPO Senior Technology Manager, Darryl Mitchell, along with President and CEO of Privo Inc., Denise Tayloe, and IPPO Software Release Assistant Brent Nemhall, proudly display awards received in recognition of the success of the NASA OPTIMUS PRIME Spinoff Award Video Contest.*

## **2011 FLC Mid-Atlantic Region Meeting** (October 4-6, 2011, Cambridge, Maryland)

The 2011 Federal Labs Consortium (FLC) Mid-Atlantic Region Meeting was held this year in Cambridge, Maryland. Members of the IPPO were presented with the Science, Technology, Engineering and Math (STEM) Award, in recognition of the success of the NASA OPTIMUS PRIME Spinoff Award Video Contest. The contest is designed to emphasize the similarities between the popular OPTIMUS PRIME character from Hasbro's TRANSFORMERS brand and NASA Spinoff technologies now being used back on Earth.

## Partnership Agreements October- December 2011

The IPPO is pleased to announce the recent signing of these partnership agreements.

To ensure the broadest and deepest pool of potential collaboration candidates, NASA Goddard actively seeks partners from as many different sectors as possible. These include commercial companies, educational and research institutions, organizations devoted to promoting regional and national economic development, government entities, and others.

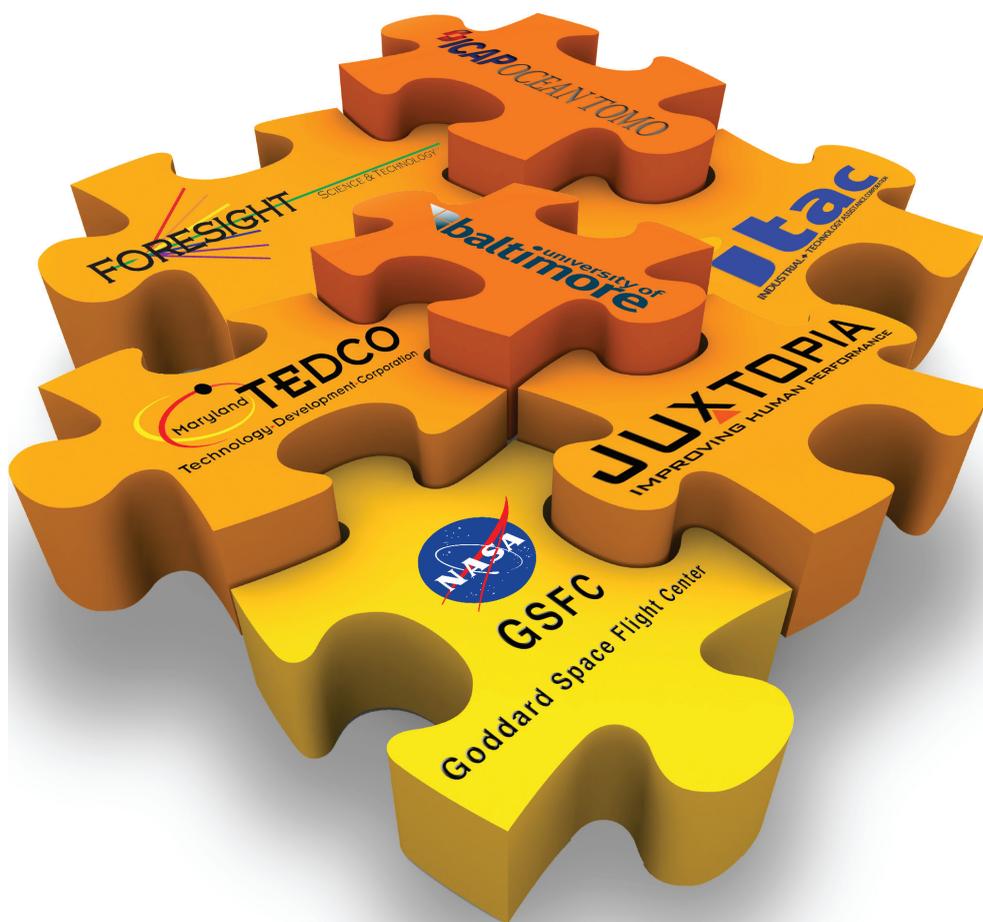
For example, NASA Goddard recently signed a Partnership Agreement with the private company Xilinx Incorporated of San Jose, CA. According to its web site (see <http://www.xilinx.com/about/company-overview/index.htm>), Xilinx is the world's leading provider of programmable platforms, with \$2.4 billion in revenues for fiscal year 2011 and nearly 50% market share. This Agreement involves NASA Goddard's SpaceCube technology, GSC-15760 "SpaceCube 2.0 and Advance Hybrid on-Board Data Processor" (Patent Pending). The purpose of this Agreement is for NASA Goddard to conduct an independent evaluation of the performance of the Xilinx integrated circuit, during an on-orbit SpaceCube technology experiment on board the Space Test Program.

A recent example of NASA Goddard partnering with academia is a Space Act Agreement (SAA) with John Hopkins University Department of Applied Mathematics & Statistics, Whiting School of Engineering (Baltimore, MD). This SAA involves the HSEG Suite, GSC-14305 "Method for Implementation of Recursive Hierarchical Segmentation on Parallel Computers" (US Patent 6,895,115) and GSC-14994 "A Split-Remerge Method For Eliminating Processing Window Artifacts In Recursive Hierarchical Segmentation" (US Patent 7,697,759). The overall purpose of this SAA is to provide technological development support for the project "Institutionalizing Protocols for Wide-Area Inventory of Archaeological Sites by the Analysis of Aerial and Satellite Imagery," which was recently funded by the DoD Legacy Resource Management Program. (For more on HSEG technology, see the Fall 2010 issue of *Goddard Tech Transfer News*.)

As noted above, NASA Goddard also partners with organizations dedicated to promoting business within certain areas and communities. For instance, NASA Goddard recently signed an Agreement

to establish a partnership with Industrial + Technology Assistance Corporation (ITAC, see also <http://www.itac.org>) to work on initiatives to facilitate collaborations between industry and academic entities in the New York metropolitan region interested in utilizing NASA technologies for commercial applications. Additionally, NASA and ITAC will collaborate to target a broad range of industry and academic entities to raise interest in science, technology, engineering, math and space-based research and development to create innovative ways to achieve technology transfer opportunities. Specifically, ITAC will collaborate with Historically Black Colleges and Universities (HBCUs), Minority Serving Institutions (MSIs), and small businesses in the New York City metropolitan area about the benefits and processes of technology transfer and technology commercialization with NASA Goddard. (NASA Goddard's relationship with ITAC is described in further detail in a separate article in this issue of *Goddard Tech Transfer News*.)

For more information on partnering with NASA Goddard, please contact the NASA Goddard Innovative Partnerships Program Office, <http://ipp.gsfc.nasa.gov/index.shtm> (phone: 301-286-5810, email: [techtransfer@gsfc.nasa.gov](mailto:techtransfer@gsfc.nasa.gov)).



## New Technology Reports

**GMSEC Alert Notification System Router (ANSR) version 3.9.3.** by David Whitney

**Room Alert Adapter 1.1** by LaMont Ruley and Javier Ocasio-Perez

**Muti-function microposters inside of microfluidic channel for Lab-On-A-Chip device** by Yun Zheng

**Planetary Polarization Nephelometer** by Don Banfield

**Floating Orbital Weld Head Support Arm** by Michael Wilks

**Ethernet to HRDL Conversion Design** by Thomas Winkert, Thomas Flately, Jacqueline LeMoigne-Stewart, and Victor Bigio

**Conical Skirt for a Spacecraft COPV** by James Harris, Matthew Buchholz, and Richard Pemberton

**On-chip microfluidic components for in situ analysis, separation and detection of amino acids** by Yun Zheng, Manuel Balvin, Carl Kotecki, Stephanie Getty, and Jason Dworkin

**On-Orbit Calibration of Gyro Scale Factor Via Spacecraft Dither** by Alan Reth

**Aluminum PMD Wettability Processing For Hydrazine Tanks** by Nickolas Moore

**Enabling Micro-Liquid Chromatography by Microbead Packing of Microchannels** by Manuel Balvin and Yun Zheng

**Spacecraft Magnetic Cleanliness Modeling System** by Guan Le and Todd Bonalsky

**Demiseable Hydrazine Propellant Spacecraft Tank** by Robert Estes, James Harris, Carlos Toro-Almodovar, David Adams, and Nickolas Moore

**TIRS Single Crystal SiliconScene Select Mirror Environmental Qualification Report** by John Hagopian, Scott Rohrbach, Vince Bly, Armando Morell, and Jason Budinoff

**Electrostatic Discharge Area Checker** by John Shue

**A new method for hyperspectral image classification based on hierarchical optimization** by Yuliya Tarabalka and James Tilton

**Filter Tilt Tuning Mount for Lens Tube Assemblies** by Raymond Di Silvestre, Leva McIntire, and Michael Rodriguez

**KILOROIC: A High Event-Rate Multi-Channel Time-to-Digital Converter** by Gerard Quilligan, Jeffrey DuMonthier, and George Suarez

**Portable Distributed Scripts (PoDS)** by Jules Kouatchou and Amidu Oloso

**SIVO-PyD: A Python Distribution for Scientific Computing and Visualization** by Jules Kouatchou, Arlindo Da Silva, and Amidu Oloso

**The RECOVER Burned Area Emergency Response Decision Support System Concept, Design, Architecture, and Operation** by John Schnase

## Patents Issued

**High Precision Electric Gate (HPEG) for Time of Flight Mass Spectrometers** by Edward Sittler

**Improvements to the Walk and Roll Robot** by Neil Parikh, Andrew Punnoose, Andrew Wilson, and Katherine Strausser

**Stability Algorithm For Neural Entities (SANE)** by Steven Curtis

**Hybrid Architecture Active Wavefront Sensing and Control** by Tristram Hyde, Bruce Dean, and Lee Feinberg

**Otoacoustic Protection In Biologically-Inspired Systems** by Michael Hinchey and Roy Sterritt

**A Method For Developing And Maintaining Evolving Systems With Software Product Lines** by Michael Hinchey, Joaquin Pena, and James Rash

**Low Cost TDRSS Tranceiver (LCT2)** by David Newman, James Bishop, Steven Bundick, Nazrul Mohdzaki

## Patent Applications

**A Method For Developing And Maintaining Evolving Systems With Software Product Lines** by Michael Hinchey, Joaquin Pena, and James Rash

## Provisional Patents Filed

**Flip Around Sub-Ranging (FASR) Quantizer** by Gerard Quilligan

## Associated Publications

- *NASA Tech Briefs* (<http://www.techbriefs.com>) is a monthly magazine with a readership of approximately 450,000 that features the latest NASA-developed technologies. The magazine also features a "NASA Tech Needs" article that addresses a technology need for which NASA is seeking a solution.
- NASA Goddard Space Flight Center is continuously seeking ideas for Tech Needs articles to submit for publication in *Tech Briefs*. This is a great opportunity for NASA Goddard researchers to reach a broader audience to find viable solutions from industry and academia.
- *NASA Spinoff* (<http://www.sti.nasa.gov>) is an annual publication that features stories on companies that have successfully commercialized NASA technology. A spinoff is categorized as a commercialized product that incorporates NASA technology or NASA "know how" and helps benefit the public. Since 1976, over 1,700 documented NASA inventions have benefited U.S. industry, improved the quality of life and created jobs not just for Americans, but around the world as well. For more information and to learn more about NASA Spinoff and view past issues, please visit <http://www.sti.nasa.gov/tto/index.html>.



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