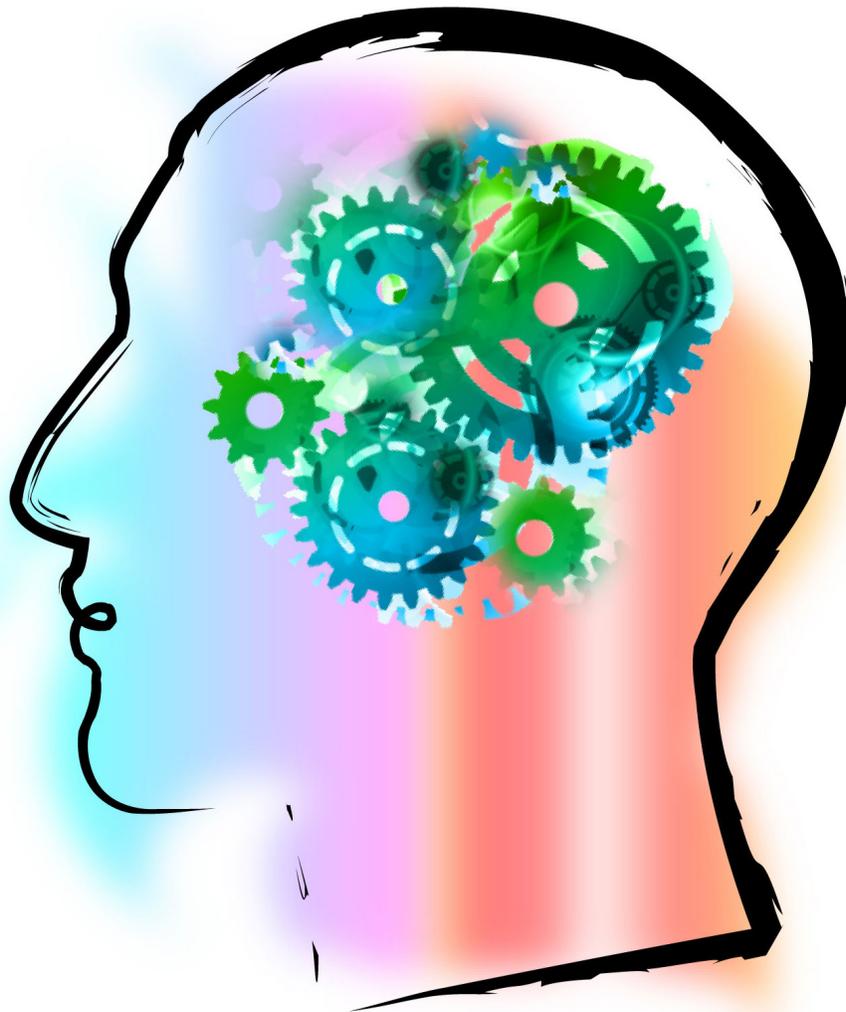




# Space Technology

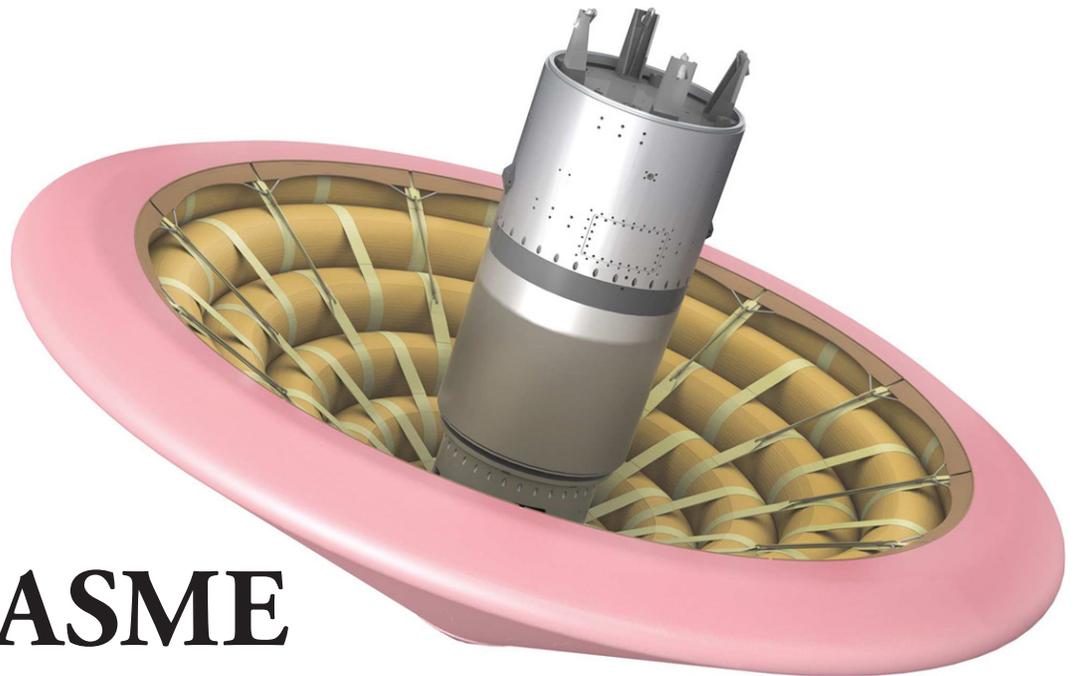
## Game Changing Development Highlights



**September-December 2014**

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Celebrating some of the many people and bright minds that keep the GCD machine running



# Boeing-ASME Recognizes Research on HIAD's TPS Aeroelasticity

—Denise M. Stefula

A Duke University student will be presented the ASME/Boeing Structures and Materials Award for outstanding paper at the January 2015 AIAA SciTech conference in Kissimmee, Fla.

With the help of his college professor and a NASA mentor, Ben Goldman wrote an award-winning paper entitled "In-Flight Aeroelastic Stability of the Thermal Protection System on the NASA HIAD, Part I: Linear Theory." The paper presents theoretical research on aeroelastic behavior of the thermal protection system (TPS) used on the Hypersonic Inflatable Aerodynamic Decelerator, or HIAD.

Goldman spent the past two summers interning in NASA Langley's Aeroelasticity Branch under the mentorship of aerospace engineer Robert Scott, who assisted Goldman with his research.

HIAD vehicle (above) used in the Inflatable Re-entry Vehicle Experiment 3. The paper is a study of the aeroelastic behavior of the TPS attached to the HIAD in flight, within the framework of linear theory. Only the TPS on the 3-m HIAD with a 70° half-cone angle is considered in this study.

Also providing a role was Goldman's professor from Duke, Earl Dowell, who co-authored the paper.

"It is truly an honor to be recognized by ASME for our work on TPS aeroelasticity," said Goldman. "I am very grateful to my advisors, Dr. Earl Dowell and Rob Scott, for their support."

Dowell is the William Holland Hall Professor and Chair of Mechanical Engineering in the Edmund T. Pratt, Jr., School of Engineering at Duke University. He teaches both graduate and undergraduate courses in dynamics and aeroelasticity.

"This has been an exciting opportunity for one of our finest PhD students, Ben Goldman, to partner with leading NASA engineers including Rob Scott and the HIAD team on an important and challenging technology," said Dowell.

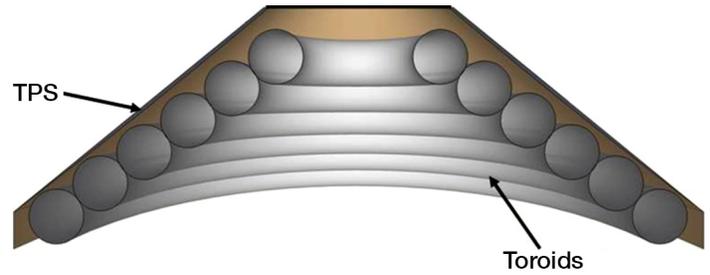
The HIAD project is led out of NASA's Langley Research Center, and both the TPS technology and HIAD have advanced in technology readiness through NASA Space Technology's Game Changing Development Program.

The SciTech technical paper program is second to none in terms of the breadth and depth of cutting-edge aerospace research it represents.

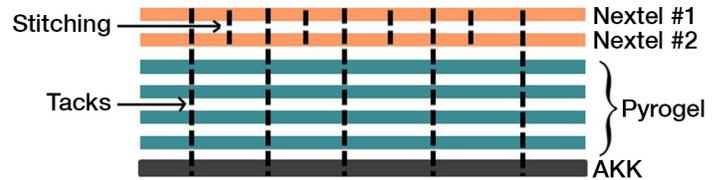
SciTech's best paper award winner is chosen from a pool of papers nominated by the conference's session chairs. Nominated papers are reviewed by the Structures and Materials Technical Committee of ASME and the achievement is based upon originality and significance to the field.

Both a plaque and a monetary award will be presented to the authors at the 56th AIAA/ASCEAHS/ASC Structures, Structural Dynamics, and Materials Conference, one of many thematic areas making up the 2015 SciTech forum being held January 5-9, 2015.

The Structures and Materials Technical Committee of ASME's Aerospace Division oversees this award; funds are provided by the Boeing Corporation and the ASME Aerospace Division.



Approximation of HIAD cross-section showing the toroid substructure.



The generation 1 TPS configuration illustrated here consists of one layer of Aluminized Kapton-Kevlar (AKK), four layers of Pyrogel 2250, and two layers of Nextel 440-BF20.



Ben Goldman performing a ground vibration test of HIAD TPS in the 8-Foot High Temperature Tunnel.

# Suited Manikin Test Apparatus Nominated for NASA Innovation Award

—Denise M. Stefula

The Suited Manikin Test Apparatus (SMTA) was nominated in October 2014 for the “Lean Forward, Fail Smart!” NASA Innovation Award. Voting closed late November and awardees are announced on NASA’s Center of Excellence for Collaborative Innovation page, <<http://www.nasa.gov/coeci/nasa-at-work/>>.

The SMTA is a transparent urethane suit with a manikin inside that is supplemented with breathing capability that emulates a human in a space suit. The SMTA was developed to augment testing of the Portable Life Support System (PLSS) ventilation subsystem by providing a safer, lower cost and more controlled alternative to human testing.

Game Changing Development’s Next Generation Life Support project is pursuing innovative technologies that will support development of an Advanced Extravehicular Mobility Unit, or AEMU, that pairs a PLSS with a pressure garment system to make up an AEMU “suit.”

The PLSS includes an oxygen subsystem, a ventilation subsystem, and a thermal subsystem. A key function of the ventilation system is to remove the carbon dioxide (CO<sub>2</sub>) delivered to the astronaut.

Human testing to fully evaluate CO<sub>2</sub> washout performance, or CO<sub>2</sub> levels control—a critical parameter—is extremely expensive due to safety requirements, and correlating



math models is challenging due to human variability and movement.

The CO<sub>2</sub> removal function is performed by a new, regenerative technology called the Rapid Cycle Amine (RCA). Performance of the RCA in the PLSS ventilation subsystem can be more adequately evaluated using the SMTA.

The uniquely designed SMTA with its breathing capability provides NASA the ability to evaluate off-nominal CO<sub>2</sub> washout conditions that would otherwise be unsafe, difficult, and very expensive for human testing due to test subject fatigue.

The nomination describes the SMTA’s first use as validating the advanced CO<sub>2</sub> removal hardware performance and CO<sub>2</sub> washout. It also describes the innovative behaviors that the team implemented to take the SMTA from an idea to a reality.

See a video of the SMTA at: <<https://www.youtube.com/watch?v=JLgJcm7Ut1o&feature=youtu.be>>



# Water Processing System Acquires JSC Senior Staff Award

—Denise M. Stefula

Johnson Space Center's Exploration Integration and Science Directorate (EISD) sponsored its third annual Independent Research and Development (IR&D) "Tech & Tell" poster session November 18, 2014, during which the Alternative Water Processing (AWP) System was recognized with the Senior Staff Award.

Dr. Daniel Barta, JSC's project manager for the Next Generation Life Support project, who orchestrated development of the AWP, said this award "recognizes the excitement, dedication and talent of our multi-center and university team members who brought this game changing idea from concept to fruition."

An AWP is a wastewater recovery system developed for recycling wastewater on long duration human space

missions. It uses two game changing technologies for recycling larger quantities of wastewater: a biological water processor to mineralize organic forms of carbon and nitrogen, and an advanced membrane processor for removal of solids and inorganic ions.

The Tech & Tell event was established to showcase some of JSC's most innovative thinkers. Principal investigators share overviews of projects and how they are being integrated to meet NASA science and JSC human spaceflight needs. This year's theme, "JSC's Technology Pathway to Mars," showcased both center-level and new EISD directorate IR&D technology projects being developed at JSC and the White Sands Test Facility.

# Annual Program Review

The Game Changing Development Program's Annual Review was held Oct. 28-30 at NASA's Marshall Spaceflight Center in Huntsville, Ala. Members of the Program Office, Headquarters and project managers convened to hear more than 25 projects give year-end reports.

Highlights of the reports included the completion of 20 projects with 8 ready for infusion and 12 infused into other missions: the successful testing of the 5.5-m cryotank; the continued development of entry, descent, and landing technologies; the delivery of the R2 legs; 3D Printer; and the tank Slosh experiment to ISS; and many more.

GCD reported that it worked with 167 students and professors, 46 universities, released over 200 publications, collaborated with at least 5 other federal agencies, made 6 awards from 2 solicitations and reached more than 300,000 people through education and public outreach events.

Project managers also supported an exhibit hall set up at the Annual Program Review by providing models, videos, posters and handouts. Guest speakers at the review included Mike Seablom, chief technologist of the Science Mission Directorate; Chris Moore, deputy director of NASA's Advanced Exploration Systems; and Fred Bickley, program manager of NASA's Space Launch System.



Project Manager Paul Wercinski shows off an ADEPT model that he made with Legos.



Several projects supported the APR's exhibit area with models, videos, posters and hardware.



The APR was well attended by NASA Headquarters.

# CCTD Team Recognized



The Composite Cryotank and Technology Demonstration (CCTD) team was recognized during the Game Changing Development Program's Annual Review in October. The team, comprising both NASA and Boeing employees, received the first Game Changer of the Year Award (GOTY).

According to GCD Program Manager Steve Gaddis (above, far left), the GOTY award “focuses less on team dynamics and challenges, and more on the impact of the technology itself.”

The program office met and discussed several candidates.

“It was a hard decision because we have so many great projects,” said Gaddis. “We went through them all in detail.”

Program management chose CCTD because of its potential impact to NASA's Space Launch System (SLS), other government agencies and industry.

“Boeing clearly has infusion plans for this technology in other programs,” said Gaddis. “We plan to provide this information to SLS to help inform industry during their upper stage plans. The potential of a 30% mass savings and a 25% cost savings is a huge impact.”

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## John Fikes Receives “Game Ball”

The CCTD “Game Ball” was presented to John Fikes as the MVP for the CCTD project recently.

The award recognized the individual project member for the most outstanding contribution throughout the life of the project. The task of selecting the MVP was difficult with so many talented and committed team members to choose from. Both NASA and Boeing individuals were eligible. The selection was made through a vote of the project's team leadership.

“John Fikes epitomizes those who go above the call of duty and make significant and long-term contributions with great teamwork, perseverance, and hard work,” said CCTD PM John Vickers.



# GCD Employee of the Month Honorees

## Arna Majcher

Arna is GCD's senior schedule analyst and has been with the program office since October 2011. Arna maintains the program and solicitation schedules along with other ad hoc reports in support of GCD activities.

"What I most like about my job is getting to work with so many different people and projects from all the NASA centers," says Arna. "It's so interesting to see the game changing ideas that are being worked on across NASA."

Steve says he appreciates her professionalism and dedication working between the program office team and the projects. "Arna does a great job balancing light touch and gathering the data we need to have schedule oversight."

Arna is a single daughter of two parents currently residing in Williamsburg, and her father has been struggling with early onset Parkinson's disease for about 15 years now. "He's been doing great since he had deep brain stimulation surgery," she shares.

Deep brain stimulation is a way to inactivate parts of the brain that cause Parkinson's disease and its associated symptoms without destroying the brain. This therapy has many promising benefits, one of which is the electrical stimulation is adjustable and can be changed as the person's disease changes or his or her response to medications change. No further surgery is necessary to make the adjustments.

*As the first 2014 GCD Highlights was published on its bimonthly schedule with the Jan.-Feb. issue, Program Manager Steve Gaddis asked that monthly employee recognitions be included giving a little personal insight into the people making up the Game Changing team.*

*"Within our Game Changing team," he said, "members contribute to the STMD mission of 'building, flying, testing' in everything they do...a GCD employee of the month [is] one who embodies the strong STMD 'can do' attitude."*

*If team effectiveness can be judged by measuring collectively the productive output of a team, Steve's work was cut out for him this year trying to identify employees of the month: it's a tough decision with so many talented, dedicated, and deserving people to consider.*

*With the final pages turning on 2014's calendar, and the Sept.-Oct. Highlights issue being preempted to publish GCD's Annual Magazine for October's Annual Review, a few more kudos remain to be covered. End-of-year honorees are Arna Majcher, Jeff Doughty, and Rob Lowe.*

Arna and her mother participate annually in fundraising efforts for Parkinson's research. "It's a cause close to our hearts."

One of Arna's favorite hobbies is singing, and she is a mezzo-soprano with the Virginia Opera Chorus. In September, Arna participated in the recital "Where the Music Comes From: what motivates us to sing?" The performance included songs examining personalities of singers from twenty- and twenty-first century composers and was a comical take on the artistic natures and personalities of performers.

Should you need some guidance on attending the opera one wintry evening in Hampton Roads, touch base with Arna. She is intimately familiar with the variety of music and performance venues available in the area. "From local community theatres and Friday night music in the park, to the Virginia Opera and Ferguson Center," Arna says, "there is always something to do."



# Jeff Doughty

Jeff worked in Resource Management with GCD until a recent transition in October returned him to Langley's Space Technology Exploration Directorate. His familiarity with GCD projects over the last few years serves him well in his latest endeavor, which includes some financial responsibilities for GCD activities at Langley.

Jeff says the people are what he enjoyed most about working with the GCD team, from the staff in the program office to project managers and resource program analysts across NASA centers.

"Working with great people made me look forward to coming to work each day," Jeff says. "It was a privilege to work with folks like Chuck Brooks, Rob Lowe and Carolyn Carey in Game Changing's Resource Management Office."

Steve says Jeff's extensive NASA experience alone could easily be the reason for selecting to honor him but emphasizes that Jeff is very capable and extremely dedicated.

"I appreciate him working so hard to make us successful these past 3 years and he will be missed," Steve adds. "Jeff is always a pleasure to work with."

Jeff and his wife Peggy met at Virginia Tech and have been married for over 38 years. Their son Clay recently graduated in engineering from Virginia Tech and now lives in Georgetown. Their daughter Paige is a senior at Radford University and is majoring in sports medicine, hoping to one day work with children with disabilities.

Jeff is an avid college sports fan, especially football and field hockey, but wasn't fully aware of the commitment level involved in today's college sports activities until Paige played Division 1 field hockey for Radford.

"In following her games, we took the opportunity to travel and visit various college and university campuses throughout the country," he says. "We learned a lot about the time, dedication, and demands required on an annual basis for college athletes to succeed on the field and in the classroom."

With both kids now well-fledged in launching their own futures, Jeff and Peggy have no plans to settle into empty nesting. He says they will move to Williamsburg within the next year and add one or two dogs to the family. "Recently we lost our 13-year-old lab, Hokie. We cannot replace her but we look forward to providing a good home for another pet."

# Rob Lowe

Rob has been the GCD lead for Resource Management two years now and says his team "counts the beans" and watches over the widely spread resources for the program office's efforts.

"Rob is a pleasure to work with," says Steve Gaddis, GCD program manager. "He is extremely hard working and goes above and beyond to get the projects what they need. Rob supports HQ very well and is an asset to the team. We are glad to have him."



About working with GCD, Rob says, "I like the variety of the challenges we deal with and listening to the smart passionate people we work with."

Outside the office, Rob enjoys coaching fast-pitch softball and playing in the garage. Right now, he's rebuilding a 1970 Oldsmobile 442, turning wrenches and doing the body work himself.

When asked if he plans to sell the Olds or drive it when restoration is complete, Rob chuckled and said, "By the time it gets done, I'll probably be too old to drive it, so I'll let the kids fight over it."

Rob and his wife Jenny, who pulls double duty as a full time mom and a full time nursing student, have three daughters. Caitlyn is a freshman at Liberty University and also plans to study nursing. Alyssa is an eighth-grader at Tabb Middle School who plays both fast-pitch softball and field hockey. Addison, a second-grader at Tabb Elementary, Rob says prides herself as the family's junior matriarch.

The Lowes are also a fur-baby family, with a dog, three cats, and one hamster. Rob says, "They are all very needy in their own way. It's a full time job trying to keep them happy."

Favorite local activities include spending time at Yorktown Beach or in one of the area's many parks and hitting the nature trails.



*Former General Electric CEO Jack Welch said, “It goes without saying that no company, small or large, can win over the long run without energized employees who believe in the mission and understand how to achieve it.”*

*For the people supporting the Game Changing Development Program and all those contributing to the many technological advances being researched and tested, believing and achieving are key to what drives them every day. These people choose to bring the highest commitment levels to each moment and every effort contributed.*

*In this segment, enjoy these in-depth interviews with two people who, like our other GCD team members, have played crucial roles in different support areas, Ryan Stephan and Amy McCluskey. One would likely agree that what they accomplished in 2014 was easier to speak of than to engage in.*

*Ryan took on the program executive role at the onset of a year commanding big programmatic and project portfolio changes. Amy spent 2014 “here, there and everywhere” to get our story out to the public, and to bring it home for us with a hugely successful event at the Virginia Air and Space Center.*

*We also take this opportunity to welcome our new resource management officer, Kaitlyn Hemingway, and bid adieu to Amir Deylami as he transitions to TDM.*

## Ryan Stephan

**GCD Q:** What role did you serve with GCD prior to becoming program executive?

**RS:** Prior to being the GCD PE, I was an STMD/GCD Principal Investigator for just over 2 years.

**GCD Q:** When did you transition to PE with GCD?

**RS:** I started unofficially in December 2013 and came on board in a more official capacity in early January 2014.

**GCD Q:** Please describe the role of GCD PE.

**RS:** I serve as the primary interface between STMD leadership and the Level 2 office responsible for executing the program content. My primary focus is to reduce the programmatic burden on the program office and, as a result, the folks actually developing the technologies.

**GCD Q:** Describe how you feel your first year as PE should be characterized.

**RS:** I would give myself a “B.” I think that we accomplished many of our initial goals and objectives. But, we also fell short on a few things that I am hoping to achieve in the next year.

**GCD Q:** How do you see the future of the PE’s role?

**RS:** I am excited to continue in this role. I think that GCD is critically important to the success of the mission directorate and the Agency. We will accomplish many of our remaining goals and continue the development of enabling technologies for our Agency.

**GCD Q:** What engages you most about being PE?

**RS:** I like the broad exposure to technologies. I “grew up” as a thermal engineer and therefore was myopically focused on thermal control technologies. This position has given me the opportunity to learn about a number of other technologies.



**GCD Q:** What has challenged you most about being PE?

**RS:** In short, the “churn.” My single greatest challenge is when and how to engage L2 and L3. Our leadership makes a lot of requests and I have to figure out how to efficiently address those requests.

**GCD Q:** You are said to have reduced the workload on Level 2 program offices and projects. What does this mean and what is the positive impact for project managers and principal investigators?

**RS:** I think that this reduction in the workload has two primary benefits. I think that it allowed us to secure additional resources that can be used to develop technologies. The second benefit is that it will allow the project managers to focus more on the technology and less on the programmatic requests that can both slow us down and impair our focus.

**GCD Q:** In the last year, some assessment for opportunities to increase efficiencies in Level 2 office functions and “touch points” was underway. What are touch points and what processes did you implement/change to streamline functions?

**RS:** Traditional NASA programs require monthly reporting for the projects. We have instituted a modified reporting cadence that requires quarterly reports and presentations.

**GCD Q:** Tell us about how the Level 1 and 2 roles and responsibilities were clarified. What distinguishes them and how will that benefit functions and processes?

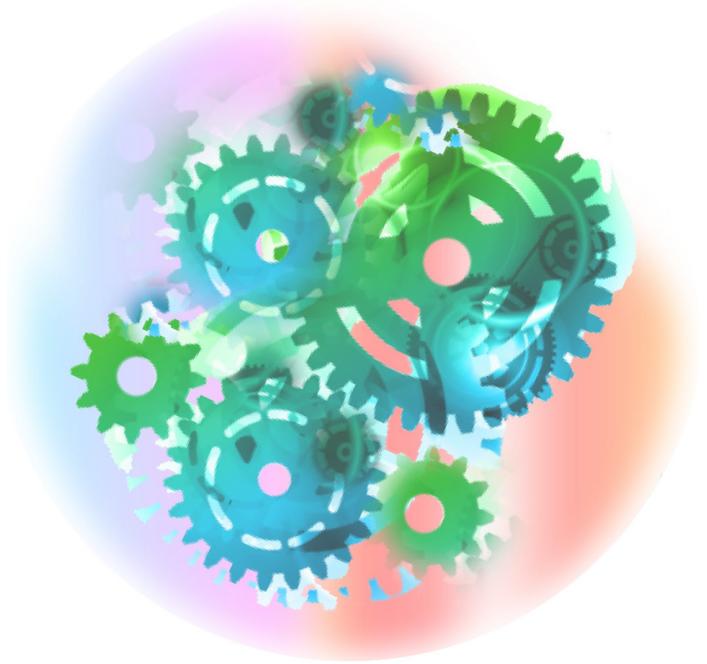
**RS:** In simplest terms, L1 is responsible for developing the program content and L2 is responsible for program execution. This can be a blurred line, but I work very closely with GCD’s program manager Steve Gaddis in an effort to address uncertainty in these gray areas.

**GCD Q:** What efforts have been incorporated to improve communications? In what areas and what are the benefits thus far?

**RS:** Gaddis makes this very easy for me. He is always available and willing to talk on the phone. He is also extremely responsive via email and text. In addition, the entire L2 program office is very professional and capable. When I can’t find the information online, the L2 folks are able to quickly provide whatever it is that I am looking for.

**GCD Q:** How was the planning, programming, budgeting and execution process streamlined?

**RS:** We made several changes to the PPBE process. We have made a concerted effort to always leave the decisional meetings with a decision. This has reduced the number of times that PIs have to come back to a



decisional meeting with an updated package. We have also reduced the number of meetings that occur before the decisional meetings.

**GCD Q:** The program manager describes one impact of your work as having implemented a more realistic budget planning scenario. Describe the changes and identify any immediately realized differences.

**RS:** I try to bring a “project manager”-friendly approach to the program. In talking with the project managers (many of whom I have worked with for many, many years), I came to realize that the most frustrating thing for a project manager is change. In the past, we always approved program content to the President’s budget. When we would enter the year of execution, we often had to cut project content because the President’s budget wasn’t available. So, instead of approving content to the President’s budget, we plan to a reduced budget level consistent with the minimum budget that we expect to receive in the year of execution.

**GCD Q:** What would you like to share with the GCD team as you cap off your first year as PE?

**RS:** The only thing that I would like to add is that I appreciate everybody’s patience and professionalism as we went through all of the programmatic changes last year. I know that we made some unpopular decisions, but everybody persevered through all of the changes and I am extremely grateful for that. I hope that we have now established a stable organization and program that everybody can be proud to be a part of.

# Amy McCluskey

**GCD Q:** Communications managers are responsible for conveying an organization’s internal and external messages. What is the key message you are tasked with conveying for the GCD Program?

**AM:** The key message is the Program Vision, which is that the Game Changing Development Program strives to be the premier organization within the Agency to rapidly advance mid TRL level disruptive space technologies from concept to demonstration. Or in short, this is a program that does things differently and we push boundaries. We aren’t afraid to fail.

**GCD Q:** What strategies do you have in place to communicate messages with GCD team members internally?

**AM:** We have several mechanisms that can help with this. From standard program template PowerPoint slides to our extensive website [gameon.nasa.gov](http://gameon.nasa.gov) to lit-up signage



Communications Manager Amy McCluskey staffed the Space Technology Mission Directorate booth during the United States Science and Engineering Festival held in Washington, D.C., in April 2014. The event drew more than 300,000 people.

in the hallway of our building, there are many ways team members get this information. I also find it helpful to engage team members in outreach opportunities, so they can actually “see” the messaging to the public take place. I find this to be the most impactful of strategies.

**GCD Q:** How would you define or characterize GCD’s perceived external audience?

**AM:** Our audience ranges from the general public to academia, from inventors to industry leaders. As with the Agency’s goal, we try to engage with a very diverse audience.

**GCD Q:** What strategies and tools are in place to communicate to external audiences?

**AM:** If we want to reach a technical audience or look for potential technology partnerships, we look for conferences and exhibits to participate in that are synergistic with the particular technology we are advocating. If we are trying to raise awareness about NASA’s space technology in general, we look to highly attended Agency-approved events to participate in, such as maker faires and science festivals. If we are looking to get attention on the Hill, we participate in congressional tours and Technology Day on the Hill among others. In addition, the website is a great tool to reach those diverse audiences.

**GCD Q:** Frequently your job requires you to represent the GCD organization to stakeholders, interested parties and the public. Tell us about your innovations in standing up the education and public outreach events you’ve held for GCD technologies. How was the demo subject matter prepared or decided upon?

**AM:** I work with our program office managers to identify high-profile projects that might have exciting milestones coming up, such as tests or hardware delivery, that will be of interest to our stakeholders and to the general public. For example, we helped fund a 3D printer that was recently launched to the ISS. Now that is exciting, relevant and cool, so I made sure that as a program office, we talked about this and demonstrated this at events.

**GCD Q:** Tell us about one of the events coordinated for educational or public outreach.

**AM:** We provided exhibit support for a NASA Langley event at the Virginia Air and Space Center for home-schooled kids. For this younger audience, we wanted to bring something to pique their interest and get them excited, so we brought our big articulating Robonaut 2 model with videos. This was a great forum to talk about

NASA's work with Robonaut 2, and it was amazing how many of the students had never heard about it.

**GCD Q:** Talk about collaborating with the project managers/executives/leads to get things going.

**AM:** Recently our nanotechnology project reached a world record in conductivity. To showcase this achievement and to help tell the story of nanotechnology, I worked with the (then) project manager Mike Meador and brainstormed ideas for an exhibit that can help relay this message. Mike had the idea of creating a nanowire box that will highlight this technology. This is a very fun part of my job, and I wish I could help create an exhibit for every one of our 50-some technologies.

**GCD Q:** Your contract organization recognized you recently for the 2014 Technology Day. Tell us about the recognition. What was the award?

**AM:** The award was a certificate of commendation from GenTech Partners for "superior performance in providing support to NASA Langley Research Center."

**GCD Q:** How does receiving this award make you feel?

**AM:** It was humbling of course, but also very much appreciated. It's nice to work for a program and for a company that recognizes its employees. Not all companies do that, and I think I am very lucky.

**GCD Q:** What was the Tech Day's purpose and where was it held?

**AM:** The event supported the Agency's technology "campaign," which kicked off in the summer of 2014. HQ suggested that each Center could hold a technology day to reach external audiences and teach them about what NASA is doing in the technology arena. Ours was the first technology day to be held in support of the campaign. It was NASA Langley's Technology Day, held at the Virginia Air and Space Center July 15.

**GCD Q:** Talk about some of the volunteers and their participation.

**AM:** We strategically held our event in the summer so that we could take advantage of the large student intern population we have at NASA Langley. I also had a great team of student interns who helped me orchestrate the event. Overall, more than 100 people volunteered. The Center's public affairs office, outreach and exhibits team, were a big help in planning and logistics. We also had a great response from project managers, engineers and researchers on Center who wanted to showcase their particular technologies.

**GCD Q:** Who were some of the prominent attendees at Tech Day?

**AM:** Virginia Delegate Bill DeSteph attended the exhibits along with Diane Kaufman, regional director for Senator Tim Kaine. Also, Charles Stanton, legislative aide to Senator Lynwood Lewis attended our evening networking event. From NASA, Chief Technologist Keith Belvin attended, as well as GCD Program Executive Ryan Stephan and LaRC Deputy Director Dave Bowles.

**GCD Q:** Describe some of the technologies on display and how they were exhibited.

**AM:** Displays included cutting-edge technology from inflatable heat shields, Robonauts in space, and lidars used for Earth observations and satellite calibration. We also had a good turnout from local industry that support NASA, like Stinger Ghaffarian Technologies.

**GCD Q:** What was the public turnout and some of the observed reactions to exhibits?

**AM:** The event drew approximately 1,500 people, which is a very good number. Reactions were overwhelmingly positive.

**GCD Q:** Will Tech Day become an annual event?

**AM:** I know there was talk about it becoming an annual event, but I've not seen anything set in stone about it.

**GCD Q:** What coverage did the event have?

**AM:** We had coverage from our local paper, the Daily Press but we also utilized social media channels (we had 46,000 impressions), and NASA's very own NASA Edge did a live stream during the event.

**GCD Q:** What are some of the plans you have for GCD EPO in 2015?

**AM:** Some plans for 2015 include new exhibits in robotics and entry, descent and landing, and more participation in Agency-level events. I want to increase our external audience and effectively communicate our relevance to the public. We also plan to engage with NASA Edge and continue the great animation work we are having done.

**GCD Q:** Tell us about your journey and what led you to doing communications work? Educationally: what did you study and where did you attend college?

**AM:** It took me a couple schools to find where I fit in, but after trying out an inner-city college, then a commuter college, I finally landed at a small Methodist college in Virginia Beach called Virginia Wesleyan, which I loved.

**GCD Q:** Professionally: what are some of the previous positions you held? Where and what type of duties?

**AM:** I started as a copy editor at a daily newspaper in North Carolina and worked my way up to a reporter

position. I've also worked as a senior writer at Busch Gardens writing everything from park signage and jingles to press releases. When my son was born I began working for myself as a freelance writer.

**GCD Q:** When you were a little girl, is this the type of work you dreamed of doing?

**AM:** I always dreamed of being a writer in some capacity. Working at NASA was not something I had planned, and probably not something anyone would have predicted, but I'm thrilled to be here.

**GCD Q:** What was it about the GCD Program that attracted you?

**AM:** I didn't know much about GCD other than that it was a new program. Steve Gaddis and Dana Gould sold it to me during my interview. They were obviously passionate about the work and that was something I wanted to be a part of.

**GCD Q:** What do you see as the greatest rewards you get from instituting GCD communications endeavors?

**AM:** The greatest reward is knowing that I'm doing something that's helping the Agency, the Space Technology Mission Directorate and the Game Changing Development Program, and that even if I only educate one person per event about the technology work NASA is doing, then I've made an impact.

## RMO Appointment Change Assigned for GCD

Ames Research Center's Kaitlyn Hemingway began a one-year detail November 2014 with Space Technology's Resource Management Office (RMO) at NASA Headquarters as Level 1 program analyst for the Game Changing Development (GCD) Program.

"We are excited to have Kaitlyn joining the Space Technology team at HQ, more specifically GCD!" says GCD Program Manager Steve Gaddis.



Kaitlyn Hemingway.

Hemingway says she believes that Space Technology is the start-up of NASA, and an exciting and motivating culture to work in. "I'm looking forward to learning more about how Game Changing Development improves technologies for other NASA directorates, public industry and everyday people."

Hemingway brings center-based experience of financially managing projects, and cost estimating and analysis, to the RMO. Her prior experience includes serving as program analyst for Kepler and K2, projects under the Science Mission Directorate's Astrophysics Division, and as lead cost estimator for multiple proposals, including the winning proposal Transiting Exoplanet Survey Satellite.

"I pursued a detail with the Space Technology Mission Directorate to learn more about the Agency's internal and external relationships," says Hemingway.

"Kaitlyn will bring a lot of positive energy to the team," says Gaddis. "We are looking forward to working with her."

The GCD team extends a warm welcome to Hemingway while also sending out a fond farewell to Amir Deylami, who served as GCD's RMO lead from January 2013 to November 2014.



Amir Deylami.

A majority of Deylami's time was spent working very closely with Program Executive Ryan Stephan in what Deylami describes as a monumental year in both formulation and execution.

"Because a majority of our content was completing and/or being delivered to other mission directorates and programs, it was time for us to replenish our portfolio and invest in pioneering new technologies for the future," explains Deylami.

In this effort, more than 30 Directorate Program Management Council reviews were conducted for evaluating and

approving programs and projects that Deylami says essentially spanned all technology and project areas.

“It was an extremely fast-paced and dynamic time for us all,” he says. “Countless options, discussions, and deliberations eventually morphed into strategically framing the exciting and diversified portfolio we have today.”

For Deylami—being a part of that process and seeing first hand all the hard work and dedication behind the GCD scenes—the experience took on special meaning.

“I am amazed by and take great pride in the remarkable work done within this program” he explains. “I strongly believe the Agency is getting the ‘biggest bang for its buck’ with the way GCD has used creativity, ingenuity, and collaborations to find efficiencies and leverage opportunities to the greatest extent possible. It’s a new age with difficult fiscal realities; however, GCD has found a way to respond to that challenge.”

Deylami transitions to RMO lead for Space Technology’s Technology Demonstration Missions, Small Spacecraft Technologies, and Flight Opportunities programs, a change that is truly heartfelt.

“We really hate to see Amir leaving GCD but we know it’s a good move for him,” says Gaddis. “What’s great is that he isn’t really going anywhere but will be working on our sister program, TDM. So we still get to work with him! Congrats Amir!”

While excited for his new opportunities, Deylami says he will miss serving GCD directly.

“When working with GCD, the technologies, the environment, and the people continued to grow on me,” he says. “I will always be an advocate for the work this program executes—it’s essential and vital to the success of NASA and this country.”

*I want to give a special thanks to Ryan, Steve, and the extended team for letting me be a part of the GCD family. The experience, relationships, and memories I gained from working with you all is definitely one I enjoyed and will never forget. Thanks for letting me share the passion and excitement. — Amir Deylami*

# Education & Public Outreach



Members of the Game Changing Development Program Office supported NASA Langley’s Journey 2 Mars event at the Virginia Air and Space Center in Hampton, Va., Dec. 6. Program Element Manager Kevin Kempton, his son Ben, Integration Manager Mary Beth Wusk, Financial Analyst Christie Rapp and her daughter Bailey spoke with museum guests about GCD’s efforts in technologies related to Mars, specifically robotics and EVA gloves.

## Success at AIAA SciTech

The Program Office kicked off 2015 with an exhibit at the 2015 AIAA SciTech conference in Kissimmee, Fla., Jan 5-8. The event drew more than 3,000 people and GCD projects Sextant, Towed Glider Air Launch System, Entry Systems Modeling, and Human Robotic Systems presented papers and/or talks at the conference. The Additive Manufacturing Technologies Project supported the event by sending exhibit pieces including an additively manufactured copper nozzle and near-net shape manufactured aluminum cylinder.

Also at the event, GCD Program Manager Steve Gaddis was recognized for his accomplishments at NASA. Gaddis was recognized as an AIAA Associate Fellow during a recognition ceremony and dinner at the conference.

According to AIAA, AIAA Fellows are “Individuals who have accomplished or been in charge of important engineering or scientific work, or have done original work of outstanding merit, or have otherwise made outstanding contributions to the arts, sciences, or technology of aeronautics or astronautics.”

“I was very humbled to have been selected by my peers for this honor,” said Gaddis. “It means a great deal to me personally. Successful missions and hard work are their own reward but it is meaningful and fulfilling for your peers to acknowledge your efforts and contributions to the industry. I pass on many thanks to my friends and peers for this recognition. I won’t let you down.”



Program Manager Steve Gaddis and his wife Marquita during the recognition ceremony.



Above, Sextant Project Manager Jason Mitchell discusses the XNAV flight software and other aspects of his project with a conference attendee.



Left, Towed Glider Project Manager Jerry Budd, staffs the booth.

# NASA Edge

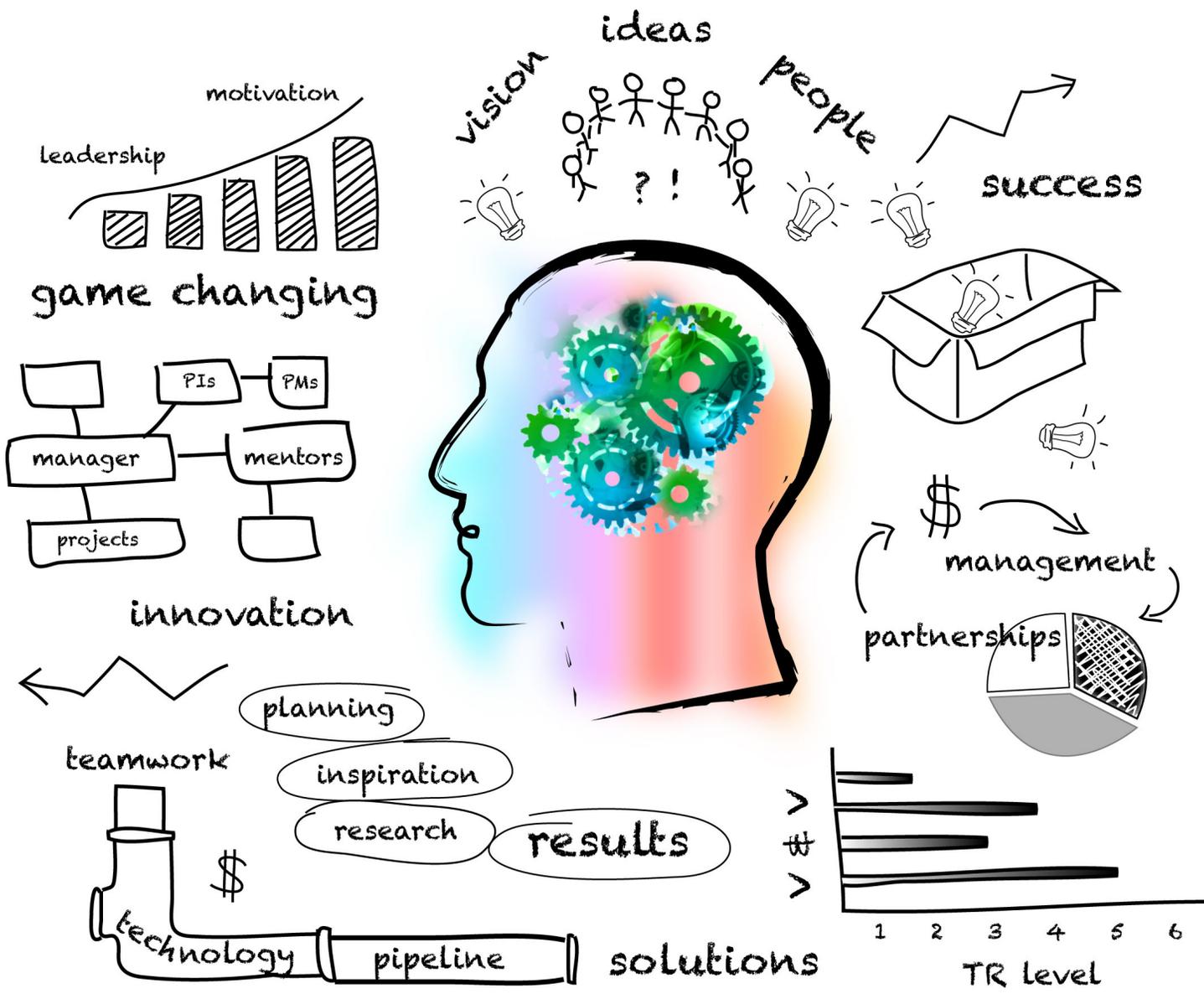
The talented and quick-witted podcast crew NASA Edge traveled to NASA's Glenn Research Center to shoot interviews for an upcoming segment on nanotechnology.



Above, Edge co-host Blair Allen interviews research chemical engineer Tiffany Williams about her work.



NASA Edge's Ron Beard and Franklin Fitzgerald get the cameras ready.



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