

READY FOR LIFTOFF: THE IMPORTANCE OF SMALL BUSINESSES IN THE NASA SUPPLY CHAIN

HEARING

BEFORE THE

SUBCOMMITTEE ON AGRICULTURE, ENERGY AND TRADE

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TUESDAY, JULY 12, 2016

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SMALL BUSINESS,
SUBCOMMITTEE ON AGRICULTURE, ENERGY AND TRADE,
Washington, DC.

The Subcommittee met, pursuant to call, at 11:00 a.m., in Room 2360, Rayburn House Office Building, Hon. Carlos Curbelo [chairman of the Subcommittee] presiding.

Present: Representatives Curbelo, Brat, Meng, and Lawrence.

Chairman CURBELO. Good morning. I call this meeting to order.

Thank you all for joining us today as we examine some of the challenges small businesses face when doing business with the National Aeronautics and Space Administration, or NASA. We have an excellent panel of witnesses, and I look forward to hearing their testimony.

During the 114th Congress, the Small Business Committee has held numerous hearings on government contracting and subcontracting issues, always seeking ways to make it easier for small firms to do business with the Federal Government. What we have learned over this time is disturbing. Over the last 5 years, the number of contract actions with small businesses fell by almost 60 percent, and one of the more disturbing figures is that there are over 100,000 fewer small firms registered to do business with the Federal Government than there were in 2012. This data means we have a real problem.

Another disturbing trend is that, starting in 2008 and continuing to this day, we are seeing more business deaths than we are business births each year. Small businesses are the canary in the coal mine. When their role in Federal contracting declines, we lose innovation, job creation, and competition, leading to higher costs to the Federal Government. This is obviously untenable going forward, and we at the Committee remain dedicated to finding solutions to stop these trends, be they regulatory, tax, capital access, or government contracting related.

When most people think about the way NASA works, they think of Cape Canaveral in Florida and the Kennedy Space Center in Houston. While those certainly are main hubs, the small businesses that work with NASA, be they prime contractors or subcontractors, are located in all 50 States and in nearly every single

congressional district. NASA's presence throughout the United States is larger than many might think.

Back in my home state of Florida, NASA spent nearly \$487 million last year with \$120 million of that going to small businesses. In my congressional district, \$1.1 million in small business contracts have been signed for fiscal year 2016. Flagship space programs, such as the current Space Launch System, or SLS, and the Orion Spacecraft, are increasingly important in providing opportunities for the small business community. However, over the past few years, with the retirement of the space shuttle program and the starting and stopping of the Constellation program, we have seen signs of uncertainty crop up in the supply chain. Too often small firms are unsure as to what an administration will do with their priorities or what Congress may or may not choose to fund moving forward. These challenges discourage some small shops from signing space contracts, instead opting for more reliable general aviation contracts.

Certainty is essential in any business endeavor but is absolutely mission critical for an exceptionally innovative and forward-thinking space program. Designing next-generation spacecraft requires time and, in recent years, thankfully, there has been bipartisan consensus on the path forward for human exploration of deep space. With a new administration taking office in January, we must build upon that commitment and provide the certainty the industry needs to continue growing, innovating, and building our economy to ensure our Nation continues its preeminence in human space flight.

Thank you again, and now I would like to yield to the Ranking Member, Ms. Meng, for her opening remarks.

Ms. MENG. Thank you, Mr. Chairman, for holding this hearing today. Since its inception, NASA has been providing young children with aspirations of going to space. While not everyone can make it through the vigorous training required to be an astronaut, the missions undertaken by the agency have opened up many opportunities for research businesses. Small businesses have had many successes at NASA as various projects within the agency have provided a platform for allowing these firms to come up with inventive research and technologies that have permitted us to explore deeper into space.

The space shuttle program in particular provided a long-term project in which small businesses would continue developing technology and to explore other uses of this technology. As a result, there have been many small business contributions that have now been incorporated into our daily lives. For example, tiny LED chips originally used to grow plants on the space shuttle and the International Space Station have made their way into a noninvasive, handheld medical device that provides relief for muscle and joint pain, and can also help reduce certain side effects of chemotherapy.

Additionally, the autonomous rendezvous and docking technology used to assist the space shuttle in servicing satellites resulted in an eye-tracking device used in Lasik vision correction surgery.

Yet, as we will hear today, the end of this program in 2011 and the changes in the space industry, have left many small businesses in the supply chain looking for ways to continue participating in

the marketplace. This is particularly troubling since small businesses affiliated with NASA are found in every state across the nation.

In 2014, commercial space activities accounted for more than 76 percent of spending in the industry. The United States in particular has seen its share of commercial activities increase. Of 86 global launches in 2015, 26 percent globally were commercial, while 40 percent of U.S. launches were commercial.

With this new reliance on commercial space providers and many of these companies performing much of the manufacturing themselves, it is vital that NASA ensure that its supply chain is maintained for future space missions. This means renewed emphasis on subcontracting opportunities and inclusion of small businesses' technologies and new projects.

NASA has been successful in including small businesses in its recent missions. Some of our witnesses here today have been involved in the various Mars missions, and there are more than 800 small businesses contributing to the Orion mission designed to carry astronauts further into the solar system than ever traveled before.

However, we are seeing a decline in small business participation overall at NASA. Since fiscal year 2013, the agency has seen a decrease in dollars awarded to these firms. Although NASA surpassed its prime small business goal of 17 percent, the dollars awarded to these firms did not grow despite NASA seeing an increase of nearly \$1 billion in dollars eligible for award to small businesses.

In the other small business categories, NASA failed to meet its goals for all groups except that of small disadvantaged businesses.

Additionally, while NASA surpassed its overall small business subcontracting goal, the agency still saw a decline of over 30 percent from its fiscal year 2014 goal. We can also expect participation to decrease in the current fiscal year as the fiscal year 2016 goals set by the agency, in conjunction with the Small Business Administration, have been set lower than the previous year's goal. That is lower than NASA's actual achievement level.

During today's hearing, I look forward to hearing about challenges facing small businesses contracting with NASA and its primes and how we can ensure that the new innovative ideas small firms bring to the table continue to play a role into the future of space exploration.

I thank all of the witnesses for being here today, and I yield back the balance of my time.

Chairman CURBELO. Thank you, Ms. Meng.

If Committee members have an opening statement prepared, I ask that they be submitted for the record.

I would like to take a moment to explain the timing lights for you. You will each have 5 minutes to deliver your testimony. The light starts off as green. When you have 1 minute remaining it will turn yellow. Finally, at the end of your 5 minutes it will turn red. We ask all witnesses to do their best to abide by the time.

Now, I would like to start introducing our witnesses. First is Mr. Chris Carberry, CEO and co-founder of Explore Mars, Inc., a non-profit which was created to advance a goal of sending humans to Mars within the next two decades. The organization also encour-

ages the use of STEM curriculum in the classroom to instill a desire to pursue space exploration for future generations. As CEO, he acts as the main liaison for efforts in project ventures. He has been an international spokesperson on behalf of various space-related entities on numerous occasions.

Prior to joining Explore Mars, Mr. Carberry served as executive director of the Mars Society. In his early career, he acted as a member of the steering committee where he organized congressional outreach efforts around the country. An author of dozens of articles and op-ed pieces concerning space policy and politics, Mr. Carberry has been featured on NBC Nightly News, BBC World, NPR, and many other news outlets. Thank you for being with us today, Mr. Carberry.

Up next we have Dr. George Davis, president and founder of Emergent Space Technologies in Greenbelt, Maryland. He received a Ph.D. in Aerospace Engineering from the University of Texas at Austin for his research into the precise orbit determination of low altitude satellites using the Global Positioning System. His M.S. in aerospace engineering, also from the University of Texas, was on on-orbit assembly operations for lunar and Mars spacecraft. His interests include GPS applications, autonomous spacecraft navigation, and orbit determination.

Prior to starting Emergent, he worked for the Technical Services Division of the Orbital Sciences Corporation as a support contractor at the NASA Goddard Space Flight Center. Dr. Davis worked in the GPS Technology Group providing systems engineering, algorithm development, receiver testing, and data analysis support to a variety of missions, including the International Space Station. Thank you for being here, Dr. Davis.

Next, we have Ms. Carol Craig, founder and CEO of Craig Technologies in Cape Canaveral, Florida. A self-described accidental entrepreneur and unconventional CEO, Carol grew Craig Technologies from 1 person in 1999 to nearly 400 associates today. Craig Technologies offers high-end custom engineering and technical support services to include software design and development, systems engineering and integration, multidisciplinary engineering, training, and courseware development, modeling and simulation, information technology support, and integrated logistics support. She holds a B.A. in Computer Science from Knox College, a B.S. in computer science engineering from the University of Illinois, and a M.S. in electrical and computer engineering from the University of Massachusetts at Amherst, and is currently pursuing a Ph.D. in systems engineering at Florida Tech. Thank you for your participation in this hearing, Ms. Craig.

I now yield to Ms. Meng for the introduction of our next and final witness.

Ms. MENG. It is my pleasure to introduce Mr. Stephen Gorevan. Mr. Gorevan is the chairman of Honeybee Robotics located in Brooklyn, New York. After only 3 years in operation, Honeybee received its first NASA contract in 1986, and since then has continued to design and develop innovative, reliable systems for space. In fact, the company has supplied NASA with critical technologies for its last three Mars missions. Mr. Gorevan currently serves as a co-investigator on the science teams for the Mars exploration rovers

and the Mars Science Laboratory SAM instrument, and is a member of the Venus Science Definition Team. Welcome, Mr. Gorevan.

Chairman CURBELO. Well, with that, we will begin our testimony, but I should say first that this is probably the most impressive panel that I have been able to listen to since arriving in Congress, so this is very exciting, and I am sure Ms. Meng shares that sentiment.

Mr. Carberry, you may begin. Thank you.

STATEMENTS OF CHRIS CARBERRY, CEO AND CO-FOUNDER, EXPLORE MARS, INC.; GEORGE DAVIS, PH.D., PRESIDENT AND FOUNDER, EMERGENT SPACE TECHNOLOGIES; CAROL CRAIG, PRESIDENT AND CEO, CRAIG TECHNOLOGIES; STEPHEN GOREVAN, CHAIRMAN, HONEYBEE ROBOTICS, LTD.

STATEMENT OF CHRIS CARBERRY

Mr. CARBERRY. Thank you, Chairman Curbelo, Ranking Member Meng, and members of the Subcommittee, for the invitation to testify at today's hearing. I am honored to be here to discuss the importance of small businesses to NASA supply chain and the significant contribution such companies make to our Nation's space program.

Explore Mars is a small, nonprofit space advocacy organization that communicates regularly with industry, including small businesses. As such, we are well-positioned to report on fluctuations, as well as progress, space policy, and how uncertainty impacts American business.

When the space shuttle was retired in 2011, it was not to retreat from human space flight but because of safety concerns in the wake of the Columbia accident and to free up funds to build new launch systems for access to low Earth orbit, as well as to take our Nation to destinations such as the Moon and Mars. Unfortunately, uncertainty caused by politics and budgetary fluctuations resulted in a growing gap between the space shuttle program and these follow-on programs.

NASA's annual procurement numbers show that the space program funding goes to small businesses in every State. Small businesses received about \$5 billion in contracts in fiscal year 2015 and about \$2.5 billion were awarded directly to small businesses and prime contracts.

According to two recent NASA small business reports, more than 800 small businesses from 47 States played a role in the Orion crew capsule program, NASA's next-generation spacecraft and, similarly, more than 800 small businesses in 43 States have supported the Space Launch System, or SLS, NASA's new exploration class rocket. With these vehicles and other capabilities, NASA hopes to land humans on Mars beginning in the 2030s.

But Mars is not a new goal. It has been one of NASA's official goals under multiple administrations and Congresses, as demonstrated by the enactment of the NASA Authorization Acts of 2005, 2008, and 2010. Most recently, the House passed its version of the NASA Authorization Act of 2015, stating that the goal of the administration's exploration program shall be to successfully conduct crude missions to the surface of Mars beginning human explo-

ration of that planet. Recent national polling also suggests very strong support from the general public, particularly when they are made aware that NASA accounts for less than half of 1 percent of the Federal budget.

Today NASA, along with U.S. industry, international partners, and others, is gearing up to achieve this goal. While much work needs to be done, we are on the verge of restoring American access to space for our astronauts. Hardware for deep space missions is actually being built, and the first workshop to discuss the potential landing zones for humans on Mars actually just recently took place. Thanks to Congress, NASA's budgets have achieved some stability in growth recently, but only a few years ago budgetary uncertainty hit NASA and the space industry particularly hard, leaving the space community, including large and small businesses in crisis.

I recall meeting with a high-ranking NASA official a few years ago who did not know whether his directorate budget would be increased by \$2 billion or reduced by \$1 billion the following year. In other words, he had \$3 billion in budgetary uncertainty, which is a tremendously large amount for any NASA directorate. Needless to say, this directly impacted industrial partners and subcontractors along the supply chain. In the same timeframe, I spoke to numerous prime contractors who also mentioned that this budgetary uncertainty impacted their decision-making. They were hesitant to spend funds, which once again resulted in a disproportionate impact on small businesses.

Space exploration is clearly not just the business of large corporations as I am sure will be made clear by the other witnesses. Small businesses play an essential role in the success of our space program, producing a myriad of products and capabilities. To assure support for these businesses, we must not be a penny wise and a pound foolish with NASA's budget. It makes absolutely no sense to allow an even modest reduction in NASA's budget, while at the same time removing any prospect of NASA achieving its mandate for Mars, particularly when only a little more and consistent funding will serve taxpayers in a manner that will provide tremendous benefits to our entire society and be remembered for millennia. There are not too many Federal programs that can achieve anything comparable.

We are approaching another major hurdle with the upcoming change in administrations. Will we shift directions again and throw our space program into turmoil or embrace our current policy of sending humans to Mars? We have come so far in recent years and it benefits no one if we radically change course again, not NASA, not large businesses, not small businesses, and certainly not the taxpayers of the United States.

In closing, Explore Mars would like to thank you for holding this hearing to highlight this Nation's small business innovations. We will be sending humans to Mars in the very near future and it will be accomplished in large measure based on the support we show for, and the efforts of, small businesses around the United States.

Once again, thank you.

Chairman CURBELO. Thank you, Mr. Carberry.

Dr. Davis, you are recognized.

STATEMENT OF GEORGE DAVIS

Mr. DAVIS. Chairman Curbelo, Ranking Member Meng, and members of the Committee, thank you for giving me the opportunity to speak to you today.

Emergent Space Technologies, which I founded in 2001, is a 60-person aerospace engineering and software development firm headquartered in Greenbelt, Maryland, with employees in Maryland, Virginia, Texas, New Mexico, Colorado, and California. We provide technical services and perform research and development for NASA, NOAA, the Air Force, and DARPA.

NASA is our primary customer, and it is known for large, complex space programs, so one might think that only large businesses are capable of supporting its missions. In fact, small businesses form a vital part of NASA's contractor workforce. Simply look at the Orion Crew Vehicle, the Space Launch System, the James Webb Space Telescope, and the Mars 2020 Rover, NASA's latest engineering marvels. You will see that we are providing unique, technical expertise and innovative engineering solutions.

Nonetheless, small businesses in the NASA supply chain face many challenges. Chief among them is a diminishing supply of small business set-asides. This is sometimes driven by contract bundling in which smaller prime contracts are combined with or bundled into larger contracts that are required under full and open competitions, but is also due to the manner in which NASA uses NAICS codes to establish prime contracting and subcontracting opportunities for small businesses.

The North American Industry Classification System, or NAICS, is used by federal agencies to classify businesses when collecting, analyzing, and publishing statistical data related to the U.S. economy. The Small Business Administration has established size standards that are matched to the NAICS codes, and they specify how large a business can be and still qualify as small for federal contracts. These contracts are expressed in either millions of dollars or numbers of employees. For example, the NAICS codes for engineering services uses a standard of \$38.5 million in revenue for small businesses. The NAICS for computer programming services uses a standard of \$27.5 million in revenue. These codes are most relevant to my company and hundreds like us. However, their size standards are roughly equivalent to a 150- to 250-person company, or about 3 to 4 times our size. The NAICS code for research and development is used most frequently by NASA for small business contracting considerations.

In February 2016, the SBA changed the standard from 500 employees to 1,000. This is 15 times larger than Emergent. For another comparison, consider the U.S. Census Bureau's 2013 statistics of U.S. businesses, which shows that 99 percent of our country's 5.7 million firms have less than 500 employees.

I recently studied the NASA prime contracts whose primary requirements are science, engineering, or software, and are strategically aligned with Emergent's business interests. There are roughly 50 of such contracts. Of these, only 35 percent are full and open competitions for companies of any size. That is the good news. The bad news is only 14 percent are set aside using the NAICS codes for engineering services or computer programming services.

The standards set by the NAICS codes and the way they are used by NASA to establish prime contracting opportunities for small businesses is important. In government contracting, size does matter. The more billable employees you have, the more you can spread your G&A costs over those hours, and so your rates are lower which makes you most cost competitive. Moreover, you can afford more nonbillable employees for business development and proposal writing, which is the lifeblood of our industry.

Given these advantages, it is extremely difficult for companies of our size to compete with those that are 10 times larger, especially when you have so few chances to develop experience as a prime contractor. Emergent and other small businesses like us have had to adapt to the shrinking opportunities for prime contracting by focusing more on subcontracting. The downside of being a subcontractor is that we have less control over our own business destinies. We have to work on multiple proposals with multiple primes, usually simultaneously, just to increase the statistical likelihood that we maintain our businesses, let alone grow them. Growing a company through subcontracting alone is very difficult. As a result, the most stable, successful small businesses in NASA's supply chain are able to prime contracts. This is where we want to be.

Two changes that NASA could make to help small businesses are, one, expand its use of small business set-asides under the engineering services and computer programming NAICS codes; and two, use a size standard for emerging small businesses, which is defined as 50 percent of the NAICS standard. This would help create new small businesses and also give existing ones like ours more opportunities to gain experience as a prime contractor. Otherwise, it is virtually impossible to compete for the larger set-asides under research and development.

In closing, I would again like to thank you for your time today. I know you understand the importance of small businesses as the backbone of our economy. All the great large businesses, from Lockheed Martin to Boeing, to Microsoft and Apple started out as small businesses at one time. In order for this trend to continue in the aerospace industry, we need for NASA to expand small business opportunities through set-asides targeted for companies our size, not just the large small businesses.

Working on NASA projects is a dream come true for me and for my employees. It is why we get up in the morning and go to work, to play a role, even a small one, in advancing our nation's knowledge of the universe and exploring our solar system.

I have touched on some of the challenges in being a part of the NASA supply chain, and there is more that I could discuss, and I would therefore be happy to follow up with you and your staff at your convenience.

Chairman CURBELO. Thank you, Dr. Davis.

Ms. Craig, you are recognized.

STATEMENT OF CAROL CRAIG

Ms. CRAIG. Thank you. Good morning, Chairman, Ranking Member Meng, and the members of the Committee. I appreciate the opportunity to testify today.

In 1999, I started Craig Technologies at my kitchen table. My husband is a Navy officer and our repeated moves and transitions led me down the entrepreneur path. By 2010, the company was successful, profitable, and reputable. With revenues topping \$20 million and through strictly organic funding I knew there was more opportunity to serve both commercial and government clients with our brand of superior service, and so I made the move into manufacturing.

My foray into manufacturing started small. I had a need for quick and quality work and realized I could do it internally with the correct approach. I purchased the assets of a small machine shop and then invested wisely in supplemental equipment, providing the company with a nimble production facility that quickly garnered interest from existing NASA supply chain members.

When KSC, Kennedy Space Center, leadership decided to pursue a non-reimbursable Space Act Agreement with a company in order to take over the remains of the NASA Shuttle Logistics Depot, Craig Technologies bid on and eventually won the opportunity to house and maintain the manufacturing equipment for a period of 5 years and utilize it for any commercial purpose. Now, keep in mind this was a non-reimbursable Space Act Agreement, and so no money was exchanged, no contracts, it was purely an entrepreneurial opportunity.

Since that time, I made the conscious decision to utilize the profits from the successful engineering and technical services division to fund the emerging aerospace solution side. I did not utilize outside capital in order to preserve the culture and autonomy that makes Craig Technologies so different than other government contractors. We grew from \$20 million in 2010, to \$45 million today. We continue to provide outstanding service and product to all of our customers with NASA as the largest. As the commercial space industry grows around Cape Canaveral and KSC continues to pursue public-private partnerships through commercial crew and commercial cargo contracts, the future for astro and aerospace manufacturing in Brevard County is poised for explosive growth and relevant economic impact.

I tell you this backstory because it leads to where I am today, at a crossroads of how to keep the manufacturing side afloat while waiting for delayed payments, extended NASA contract decisions, and lack of access to working capital because of stringent banking regulations imposed by the federal government. I have effectively robbed Peter to grow Paul. I did so because it was the right thing to do, for our business, for our employees, and for our community. I believe in our free market system and always strive to offer the very best product and service for the price agreed upon.

Unfortunately, the cards remain stacked against the small business entrepreneur, even one who overcomes the odds and makes it to the next level. Unforgiving and uninformed covenants by lending institutions lead to myopic attitudes towards growth in the government sector and the milestones that point toward long-term stability and success.

Creating valuable employment opportunities in my community still remains my number one goal and priority, but money has to

come in the front door on a logical and planned timeline in order to properly budget and ensure the books remain solvent.

Manufacturing built this country. We lost it to cheaper and inferior overseas suppliers and then we complained when the jobs went away. Now there are numerous folks like myself who are laying it all on the line to recover the industry. We need help and we need it now. We do not want handouts, but rather a fair and predictable system that ensures that payments are made and contracts are satisfied without political whim. What if more and more companies my size, like myself, are unable to succeed and close their doors? The impact on communities and our nation will be devastating.

NASA continues to explore and innovate and their supply chain remains critical to both long and short-term success.

I urge you to report to the full body that commitment to a clear path and mission with 10-year budget cycles is crucial to the continuation of small business partnerships with NASA, and collaboration with lending institutions through small business offices within the agency will allow the banking world to understand the nuances of our government contracting and work.

Pursuant to your questions, I offer my thanks for your time.

Chairman CURBELO. Thank you, Ms. Craig.

Mr. Gorevan, you are recognized.

STATEMENT OF STEPHEN GOREVAN

Mr. GOREVAN. Mr. Chairman, Ranking Member Meng, and distinguished members of the Subcommittee, thank you for the opportunity to share my perspective as a small business contractor to NASA. NASA, working with small businesses, is creating amazing technologies for flight, for our exploration, and together we help keep American innovation the envy of the world.

Honeybee Robotics is a company I cofounded in 1983. The company has been supporting NASA from our headquarters in the Brooklyn Navy Yard and from our facilities in Colorado and California. We build robots and mechanisms for tough environments, such as planetary exploration spacecraft, and we have worked for most of NASA's centers. To get an idea of the kinds of things we do, I point to the Mars program, where Honeybee Robotics has designed, built, and integrated vital devices onboard all four spacecraft NASA has landed on the surface of Mars since the year 2000. We have achieved several firsts, including developing the first tools to break into rocks on Mars and the first tool to sample ice on Mars.

Now I will take a little time to humbly make some observations and suggestions with respect to NASA and small businesses. First, while manned programs such as the Shuttle and Orion are important to small business, NASA's Earth science, planetary science, and exploration R&D are also critical areas where small business can contribute to the agency's mission.

Second, the ability for small businesses to deliver useful technologies is dependent on long-term mission clarity. Unfortunately, even when a small business has its technology selected for flight, delays are frequent and project cancellations are an ever-present risk. Small business contractors often bear that risk and pay the

price when the nation's political leadership changes NASA's mission priorities.

Third, small businesses face significant headwinds competing for contracts that require matching investment. This is because most space exploration innovations lack immediate commercial application and matching requirements, which effectively boxes out small businesses in favor of more highly capitalized large businesses. Eliminating or reducing matching investment requirements for small businesses, particularly new small businesses, will liberate NASA to choose from companies with the best technology, not only from those with sufficiently large internal budgets.

Finally, I would like to say a word about the terrific Small Business Innovation Research program, a program that has proven vital to both small businesses and NASA. I submit here two suggestions to improve the program, neither of which requires new appropriations. First, if Congress would gradually increase the share of funding that federal agencies allocate to SBIRs from the current rate of about 3 percent up to 5 percent, it would provide for a dramatic lift, I think, especially if the new funding were spent to support technology once it exits the phase two program. At that point, a company often finds itself having developed a functional system but facing the so-called valley of death before it can demonstrate commercial viability or flight readiness.

Second, the SBIR program's success depends on the ability to match NASA's needs. NASA currently places a communication ban between companies and the agency when it releases its solicitation. Instead, I suggest NASA take a page from the Department of Defense, which holds a month-long prerelease period when a small business can ask questions about the technology requests. I believe that having this window of dialogue prior to the formal NASA SBIR solicitation release will produce higher quality, better targeted technology development.

Today, Honeybee Robotics has grown and works in many different fields for Uncle Sam and for private industry around the world. We are having a fantastic run, actually, but in my heart it all stems from NASA. I was one of those first graders marched into our school cafeteria with the rest of the student body and set before a stage-mounted television to watch the launch of Friendship 7 carrying John Glenn to orbit. I have never forgotten it and I was hooked hard. I wanted to work for NASA ever since.

Blessedly, my childhood dream has come true, and now as a professional and adult I have found NASA understands very well the ways in which the small business community can help it succeed with its mission. Thank you.

Chairman CURBELO. Thank you very much, Mr. Gorevan. Now, we will begin the first round of questions. I will recognize myself for 5 minutes.

Mr. Carberry, let us go big picture first because I think it is important for our constituents to understand why we are here and why we are having this conversation. Why is it so important for the United States to push the limits of science and space exploration? How does society broadly benefit from this exercise?

Mr. CARBERRY. Frankly, it would be a much different world if we had not done that. If we had not had the space program, if we

had not gone to the Moon, and done all the other things we have done in space, and exploration in general. It has benefited society enormously. One of the main reasons we should push is to try to inspire kids to get a STEM education, get into technical fields that benefit our entire society. It is not just the economics that are affected directly by hiring small businesses that are very important, but also think by inspiring goals. Big goals like going to Mars or going back to the Moon or elsewhere. It shows the country, and it shows the world that we are still capable of big things, and I think this translates into the economy as well. When the country has a positive outlook and, can see that we are doing great things, that translates directly to our economy. We have all seen that economies are largely based on psychology; anybody watching the stock market can see that. When the country feels that we are doing exciting, bold things, and we are pushing the boundaries, I think that has a dramatic impact on the overall feel of the country and the economy as well.

But as for actual programming, I think it is very important that we have to find a way, stick with the program, and show people that we actually mean it. We have had a problem over the last, well, multiple decades, actually, when starting programs, then there is a change in administration, then we shift directions and we start from scratch again, and we never seem to make traction. People begin to lose faith that we are actually going to get it done. As a number of people have mentioned, we are at a very pivotal moment right now going into the next administration. If we can really continue the momentum and start accelerating that momentum into the next administration, I think we can achieve some really remarkable things that will impact the country dramatically, as well as the entire world.

Chairman CURBELO. Thank you, Mr. Carberry.

Dr. Davis, you mentioned something about prospective employees and their preferences for small firms, particularly younger workers. What do you think they find attractive about working at small firms as opposed to the larger, better-known firms?

Mr. DAVIS. That is an experience I had. Before I started Emergent, I was working for a large company, and then I took a hiatus from the aerospace industry and I worked for an IT company for a couple of years. It was a very different environment over there. Aerospace is a very top-down, military style chain of command, with lots of rules and regulations. I go to an IT company where people wear shorts and flip-flops, and I can just go walk into the president's office and have a conversation with him. That would never happen in the company I worked for.

When I started Emergent, I wanted to have that same kind of atmosphere and feel. This was in the early 2000s. I noticed it was not as hard to recruit young engineers to a small aerospace company, and I think it is because growing up with the Internet and social media, they just have this idea that work should not be as formal as the way mom and dad did it. They want to go to these smaller companies where culture is very important.

So I am sure at your company, Craig Technologies and at Honeybee, we know our employees. We know their children. There is this sense of camaraderie and teamwork, and that is what young

people want at work. It is the kind of place that we wanted to start and have as our businesses. I think it is increasing, you know, I started out having to make comparisons between, hey, you come work for me and it might be a little more risky than going to the larger companies but at least you will have more say in what you do. That is another aspect of it.

I have to make that case less and less now. I just tell them, hey, come work for Emergent. We do really cool stuff. We do cutting-edge research. We work for these customers on these projects. They walk around our building and they talk to people and they just say, you know what? This is the kind of firm that I want to be in. I think for recruiting the younger engineers who have advanced degrees, 60 percent of our employees have a master's or a Ph.D. in engineering or computer science, they want to come work for these smaller businesses. It is critical for the aerospace industry, is recruiting that high-tech talent to the space program.

Chairman CURBELO. Thank you, Dr. Davis.

Now I would like to recognize Ms. Meng.

Ms. MENG. My question is for Mr. Carberry, or anyone can probably answer. Like many other agencies, and as you have all mentioned, NASA has seen its budget reduced and fluctuated. Mr. Carberry, in your testimony, you discuss how budget uncertainty results in cautious spending from major contractors. Do you have examples of how this has disproportionately impacted small businesses, and do you believe that NASA has made necessary adjustments to ensure that small businesses still receive their fair share of contracting opportunities regardless of the budget, and what more should NASA do?

Mr. CARBERRY. I can send you specific examples, but I think one of the biggest problems was, and this was a few years ago, largely coming out after the retirement of the shuttle, but also after the change in administrations we shifted course again. For a while, because there was a lot of disagreement within the space community itself, everybody was in limbo. It was similar in the budget itself. The budget was fluctuating at the time, so people were not as anxious to invest money in NASA. We did not quite know where we were going, when there is not a clear path, it is difficult. At least from the experience I had talking with the prime contractors, they are not quite sure which direction, if we are going to go to the Moon, we are going to go to Mars, we are going to go to an asteroid. If we are not quite sure what the direction is and what the timeline is on that, it is very difficult for them to plan. If they are not planning, they are very hesitant to actually invest the funds.

I can actually get you more specific information directly on it, as it filtered down or did not filter down to small businesses, but I recall very clearly in all these conversations, how worried everybody was and they did not know where we were going. In addition to budget, it is overall direction and keeping clarity in policy because even if you have a full budget, if you do not know where you are going, it is hard to make these investments.

Ms. MENG. Do you think NASA has done an adequate job, or what more should it do in helping transitioning these small businesses from programs that have concluded, like the shuttle pro-

gram, to its newer missions? In terms of more clarity in policy and vision, do you all feel that that is the major issue?

Mr. DAVIS. There is a number of missions that are much smaller and less visible than the shuttle, the station, SLS, and those kinds of things, the planetarium missions, Earth science and space science missions. All of those missions feed the NASA pipeline, and cancellation of any of those missions can have a devastating effect on a small business. Much larger businesses who have deeper pockets might be able to ride out a cancellation while they find work elsewhere. Maybe they lose some profit. Small business can have its subcontract canceled and people can lose jobs. When someone loses their job, they may exit the industry and not come back.

I go back to what Mr. Carberry said about having certainty in the planning of how, these missions are funded and how, they are appropriated. We even look into the legislation to see what is coming, and we expect those to be there, and we plan on those being there. Our customers, NASA and their primes, expect all those things to be there. When those get suddenly canceled, there is not much NASA can do about that, it is out of their control sometimes. So I would have to say that the budgetary certainty is just critical.

Mr. GOREVAN. This is a very tough problem and I really cannot point to a specific solution, but the cancellations are especially difficult.

I worked on a joint U.S.-European mission, and I can tell you, there are some things about the way the European Space Agency works with respect to competition that I do not really like myself, but there is a reputation among the Europeans, for some reason, they are more consistent. When they say they are going to do a mission, they finish it. I am not an expert on why that is, but I think that NASA or Congress should try to look into why this is so.

Back when the Rosetta Mission started, NASA was part of it, and I was part of the JPL version of that mission, and it was a little embarrassing. I mean, we had terrific technology, and we went down the road and we were canceled. I mean, the American segment. Rosetta went on to glory, but the American segment was canceled and it was in stark contrast to the Europeans continuing on for 12 more years to a very successful mission.

Ms. MENG. Thank you. I yield back.

Chairman CURBELO. Thank you, Ms. Meng.

Mr. Brat, you are recognized for 5 minutes.

Mr. BRAT. Chairman, I yield my time to the chair.

Chairman CURBELO. I thank the gentleman.

Ms. Lawrence, you are recognized for 5 minutes.

Ms. LAWRENCE. Thank you.

Many people do not associate the State of Michigan, which I am from and represent, as being associated with the space exploration, but small businesses in my state play a major role in manufacturing products. In the fiscal year 2015 alone, NASA awarded contracts to over 50 small businesses in the State of Michigan. One example is SpaceX, a major design and manufacturing company focusing on rockets and spaceships, which spent over \$22 million with suppliers in Michigan, including \$3.3 million to businesses in my district. More importantly, 75 percent of Space X suppliers are

small businesses, so that is something I am very proud of. Your comments today really resonate with me because it has a direct impact on my small businesses.

Dr. Davis, I co-chaired a bipartisan caucus, the Congressional Investment in American Skilled Trade Workforce. You spoke of the educational level of your employees. I am always looking for ways to get younger Americans interested in the STEM professions. I am sure you employ, all of you, skilled trade workers, and you also know that the average skilled trade workers are in their fifties, and we are not generating the next workforce to replace them when they decide to retire. Many of us grew up and got excited about the space industry by being forced in our classes to sit down and watch it on TV, like you Mr. Gorevan, but in your opinion, what are the best ways to attract young individuals to pursue a career in your field?

Mr. DAVIS. I serve on the External Advisory Committee for the Aerospace Department at the University of Texas at Austin, so I get to interact with students quite a bit. One change I have seen in the last 10 years at the university level has been hands-on engineering experience building CubeSats and small UAVs. The students are working on these projects. We did not do this back in the 1980s when I was in school. They come out with hands-on experience building things and are learning how to solder and learning how to wire, and learning how these systems work so when they are done they have significant confidence and experience and they want to go do bigger things.

Now you see high schools are building CubeSats. Thomas Jefferson High School in Virginia has been building CubeSats for about 5 to 7 years, and I have been to the International Space Station Utilization Conference a couple of times. Last year it was in Boston and they had a whole panel session on high school students from Chicago and other cities that were working on CubeSats and projects that would go up into the station as part of a hosted payload experiment. So I think pushing that further down into middle schools and into elementary schools, and it does not have to be a CubeSat. You know, building a model plane and then going outside and flying it, the technology, the products are there. You go to a hobby shop and you can buy things now and build it yourself that was not available to us 20, 30 years ago. So I think it is that hands-on. Kids need to be engaged.

My kids look at the space program as what Dad does. That is cool, but when they go on the Internet or they go to the movie theater they see things that look almost real, they say, how come you are not doing that? And I am like, well, son, that is not real, but some day it will be if people like you get the education and go on and do it. We need to start early, earlier than we thought. High school is not early enough. You need to get them in middle school, and if you can, in elementary school.

Ms. LAWRENCE. I thank you for your understanding of our challenge in America. To sustain your economy and your industry, we must invest in the skilled trade workforce. I encourage you to not only talk individually to your family, but also provide opportunities to connect to your local communities. Have a day in your facility where you bring in young people and expose them to what

you do. We do have to connect it to the movies or else they do not get it. Say, you can go into this field and create what you see on the movies.

I heard what you said about the changes in administration, and that is something that has resonated. I thank you for bringing that to our attention because I think about the funding and sources that are available but not about how that change of administration that directly impacts the investment into your company. Thank you so much for being here.

I yield back.

Chairman CURBELO. Thank you, Ms. Lawrence.

I recognize myself for 5 minutes.

I think at least one of you said that your firm was starting to look at other sources of business, such as general aviation, because it is more stable and because it is more predictable. Is this prevalent among small firms like yours, like these? What are the risks for NASA if that trend continues? Ms. Craig, maybe do you want to take that?

Ms. CRAIG. Sure. Actually, since I started the company, diversity was very, very important to me for that very reason. You cannot count on necessarily the Department of Defense or NASA with all the different budgets. In our manufacturing facility, we were kind of a victim of the same thing we have been talking about, the planned programs and budget cuts that you expected. Everyone was excited because the shuttle capability could be maintained and we are today where we are now 4 years later. We should have been there 2 years ago. But we absolutely had that plan and have done it where you need to diversify.

The problem that happens at NASA is they are counting on the timelines. They are counting on their suppliers to deliver. Even if the timeline is solid, there might be changes in specifications, design engineering, and you have to be held, a requirement by NASA, they still need those timelines to be met. There is no flexibility for a supplier to say, oh, but I have another customer that needs this done at this same time so you are going to have to slide to the side. I think that is the challenge, and that is why we start to look for diversification into other areas. But what is going to happen is pretty soon no one is going to want to do business with NASA at the expense of the other customers.

Chairman CURBELO. So yours is not the only firm that is doing this, you are seeing this from colleagues?

Ms. CRAIG. Yes. I have colleagues who have said I will not do business with some of the large tier one suppliers to NASA anymore. They are smaller organizations but their are varied reasons. One is the regulations, all the paperwork, the certifications and, all that, but also the sliding timelines, lack of payment, and things like that. There are a lot of those decisions being made.

Chairman CURBELO. Do you consider this a midterm or long-term threat to NASA's ability to meet its mission, if suppliers are focusing on other business opportunities?

Ms. CRAIG. I would say so because it also takes NASA time to build up a supplier, then if the supplier no longer wants to do business or can no longer do business, now they have to move and find more suppliers. So it is costing them money as well. So yeah, I

think that is a significant problem. The budgets are a significant problem, too, because quality is important, set-asides are somewhat important, but it all becomes dollars.

Chairman CURBELO. Does anyone else want to add to that? Dr. Davis?

Mr. DAVIS. Yes, I would like to add to that.

We have looked at diversifying our customer base. The DOD and the intel communities have much larger budgets than NASA, and space situational awareness is becoming an increasingly big part of what these organizations are looking at, so it is a natural place for us to go. It is difficult, but when you are faced with uncertainty with NASA and, not a lot of opportunity to prime, at least we know that the DOD budgets are going to be stable and funded over long periods of time. If we are going to make that commitment, there is probably some payoff. It may take a while to get to there, but we are also looking at branching out into health care and other sectors just because, again, the budgets there are much bigger and seemingly more reliable.

I have talked to young people, high school and college age, who are aware that NASA's budget changes with administrations and there is uncertainty in that. And so they are like, well, I am not going to go into aerospace engineering. I am going to go into civil engineering because my parents have told me that NASA is just not a reliable place to go work. To me, it is sad that our nation and the young people who are getting the education to become the workforce of tomorrow cannot rely on the space program as a place to get good, high-paying, high-tech jobs that are going to be there.

Chairman CURBELO. Let me take you back to NAICS, which you mentioned during your testimony as well. Do you think that is a potential quick fix for some of the challenges firms like yours are facing? Do you have any specific recommendations on how we may reclassify these firms or come up with new definitions?

Mr. DAVIS. Sure. I think the biggest challenge is a company of my size, if we are going to compete for a proposal, you are going up against three or four other companies and it is knock-down, drag-out competition. To take on a company that is much, much larger than us is an unfair fight. It is like putting a featherweight against a heavyweight, you are not going to win that battle very often. Using those NAICS codes, the engineering services and the custom computer programming services more often as a small business set-aside gives us more of those chances. But even then, if you want to start new businesses, you have to create a new code or a standard that is even smaller than that. Right? A 250-person company is still 4 times larger than mine, so if I am going to compete with them for a proposal, they are going to have 4 times the advantage in my opinion. But if there was a smaller code that, say, limited the size to 100 or maybe \$15 million, \$10 million in revenue, that would make the competition a lot more fair and balanced, and I think that would encourage new small businesses to start up.

It is intimidating to write a proposal, the transaction cost to write a NASA proposal is quite high. You have to put together a 100-, 150-page book that has technical, management, costs, past performance, and then all the plans that go along with that. Obviously, larger companies have a big advantage in that. If you want

the new small businesses to come up, you have to narrow the competition down and you have to make the transaction costs lower.

Chairman CURBELO. Thank you, Dr. Davis.

Ms. Meng, do you have any additional questions?

Ms. MENG. I just wanted to inquire about the online resources that NASA has to help individuals and small businesses interested in working with NASA. Are small businesses using these resources at all or do you rely on trade associations for guidance? How can the online resources be improved if they are not being used enough? Maybe Ms. Craig or Mr. Gorevan?

Mr. GOREVAN. I am sorry, online resources for finding people to work for you?

Ms. MENG. Business opportunities with NASA.

Mr. GOREVAN. Oh, business opportunities with NASA.

Ms. MENG. Yes.

Mr. GOREVAN. Of course, we use online resources at my company. The SBIR program is heavily based online and we make quite a bit of use of these types of things. I think since 2013 alone we have had 61 NASA contracts that all came from online sources, so I would say that they are very useful. I cannot really point to any improvements that are really necessary except I think perhaps maybe identifying some of the contacts that we could talk to. As I mentioned in my testimony, sometimes when these online solicitations are released we are not allowed to speak to anyone, and as I said, the Department of Defense does allow a month period where you can talk to people. I think it would be better for both parties if that was allowed to happen at NASA.

Ms. CRAIG. I will comment on that, also. When we were about 10 employees, I had initially tried to pursue what you are talking about, the online resources, whether it was for—there is one FedBizOpps or it is the NASA, trying to find opportunities, but increasingly was told if you are looking there you are behind the power curve. We had to invest in third-party companies or products. There are some other, GovWin, e-pipeline at the time, and then you are able to get all the information to really more effectively bid on opportunities. There is somewhat of an issue and that may be government-wide, globally when it comes to finding those opportunities, and that is some of the struggles of small business. You have to be out there making your case and it takes 18 months or more to be able to make that case, understand what the customer wants, go in and speak with them and be intelligent enough to bid on a particular opportunity. A lot of that is done through subcontracting, but that is a long timeline, and a lot of companies cannot survive that long, especially on the uncertainty of whether or not you are going to have that opportunity. So there could be ways to improve by providing more information and more opportunity to come in and discuss, like you said, with the SBIRs. They do it very well. That would be helpful, but, it is a challenge, especially for the really small companies that cannot afford third-party companies.

Mr. DAVIS. I would like to add to that. We use GovWin, which is a third-party service, and then the NASA online resources are kind of secondary. So you start with GovWin and then you go to the online resources. The one online resource that NASA could im-

prove is the forecast, and that forecast needs to be updated regularly. It is supposed to be updated quarterly. That does not always happen. Then the information that is in there has to be true and accurate. They do not always update who the person is, who is the CEO or the COTAR or whatever. I will see an opportunity on GovWin and I will get all I can get from GovWin, but then I will also go to this forecast for the various NASA centers and then try to match that up with what I see from GovWin. Just having that more accurate and updated timely would be good.

I think the biggest challenge is that in government contracting there is no how-to manual for us to start our businesses. No one said, hey, this is what you do, step one, step two, step three. This is how you do business with NASA. When I have read those things I am like that is not how you do business with NASA, if you did that you would have no business. They should probably engage with some small businesses that have some real war stories to tell that can say this resource is not really useful, and neither is this one. You get these small business specialists, and bless their heart, they are trying to work hard and help us out, but a lot of times I just feel like they do not really know the challenges that we face and the things that we have to overcome, and the actual information that we do need.

For example, when I started my company, I was blissfully ignorant of the need for a contract vehicle. I just thought you could start a company and be smart and have good ideas, and somehow you would be connected up to this money that would come to you to do work. It turns out, no, you have to have a contract vehicle, you have to have a prime contractor. That prime contractor may or may not let you on their contract. Even if NASA wanted that company, I need that company, the prime contractor may say, no, they were on my proposal team so I do not need to have them on. I have seen that happen. That has happened to me, and that is a barrier. The blocking and tackling of being a small business in the government contracting world, that kind of information could be very useful to small businesses. I do not see that in the online resources.

Ms. MENG. Thank you. I yield back.

Chairman CURBELO. I want to thank all of you for your time this morning. We have learned a lot, and our goal here is to make sure that the small business community in our country can thrive and grow and create opportunities for every American, but especially for those who need them the most. Young people who are looking for work, immigrants, low-income people, small businesses have unique access to those types of individuals, and I am very grateful to all of you and to all of our colleagues who participated today.

For more than 50 years, American global leadership in human space exploration and space science has been a bright shining light of innovation, technological advancement, and scientific achievement. Small businesses are the foundation of the industrial base needed to maintain and build upon that advantage. We here at the Small Business Committee are committed to expanding small business opportunities to conduct business with NASA and throughout the Federal Government.

I ask unanimous consent that members have 5 legislative days to submit statements and supporting materials for the record.
Without objection, so ordered.
We are adjourned.
[Whereupon, at 12:06 p.m., the Subcommittee was adjourned.]

A P P E N D I X*Ready for Liftoff: The Importance of Small Businesses in the NASA Supply Chain*

United States House of Representatives

Committee on Small Business

Subcommittee on Agriculture, Energy, and Trade

Testimony of Chris Carberry

Chief Executive Officer, Explore Mars, Inc

July 12, 2016

Thank you Chairman Curbelo, Ranking Member Meng, and Members of the Subcommittee, for the invitation to testify at today's hearing. I am honored to be here to discuss the importance of small businesses to NASA's supply chain and the significant contributions such companies have made in the past and will continue to make to our nation's space exploration programs.

Explore Mars is a small, non-profit, space advocacy organization that communicates regularly with industry, including small businesses, on an ongoing basis. As such, we are well-positioned to report on the fluctuations, as well as progress, in space policy over the last few years and how budgetary and policy uncertainties impact American businesses, in particular, small businesses.

When the Space Shuttle was retired in 2011, it was not to signal an American retreat from human space flight. Rather it was because of safety concerns in the wake of the Columbia accident as well as to enable the United States to transition to new generations of more cost-effective launch vehicles and to build systems capable of taking our nation beyond Low Earth Orbit (LEO) to destinations such as the Moon and Mars. Unfortunately, uncertainty caused by politics and budget fluctuations caused a gap between the Space Shuttle program and these follow-on programs.

NASA's annual procurement numbers show that space program funding supports small businesses in each and every state. Small businesses received about \$5 billion in contracts during Fiscal Year 2015, including about \$2.5 billion awarded directly to small businesses in prime contracts. According to two recent NASA small business reports, more than 800 small businesses from 47 states have played a role in the Orion crew capsule program—NASA's next generation spacecraft designed to carry astronauts to deep space destinations. Similarly, more than 800 small businesses in 43 states have supported the Space Launch System (SLS)—NASA's new exploration-class rocket. This supply chain is not limited to human space flight. Innumerable small businesses have supported

other valuable programs at NASA, such as the Mars Science Laboratory, with the Curiosity rover that has been robotically exploring Mars for the past four years, as well as other science and technology programs.

Indeed, NASA's supply chain provides tens of thousands of jobs around the country. These are good, high-paying jobs that contribute in many ways to their local economies. In addition, opportunities to work on NASA's space programs—to accomplish that which humanity has never accomplished before—serve to inspire our nation's youth to go into science, technology, engineering, and math (STEM) fields, building the highly-skilled workforce of the future.

NASA currently hopes to land humans on Mars beginning in the 2030s. Landing humans on Mars is not a new goal. It has been a priority since the days of the Apollo Program, and it has been one of NASA's official goals under multiple Administrations and Congresses, as demonstrated by the enactment of NASA Authorization Acts of 2005 (P.L. 109-155), 2008 (P.L. 110-422), and 2010 (P.L. 111-267). Most recently, the House of Representatives passed its version of a NASA Authorization Act of 2015, stating in Section 201(a) that "Human exploration deeper into the Solar System shall be a core mission of the Administration. It is the policy of the United States that the goal of the Administration's exploration program shall be to successfully conduct a crewed mission to the surface of Mars to begin human exploration of that planet..." Recent national public opinion polling has also shown that there is overwhelming support by the American people for this goal. This is particularly true when they are made aware that our space program is not (as is the subject of myth) an expensive luxury, but actually accounts for less than one-half of one percent of the federal budget while providing critical benefits to our economy, our national security, and our leadership position in the world.

Today NASA, along with U.S. industry, international partners, and others, is gearing up to achieve this goal. We are on the verge of restoring American access to space for our astronauts, while hardware for deep space missions is now actually being built, and the first workshop to discuss potential landing zones on Mars was recently held (with more to come). We are bringing our nation back to deep space with American innovation, ingenuity, and technical prowess and manufacturing—U.S. industry is hiring highly-skilled engineers and technicians, building state-of-the-art facilities, bending metal and test-firing engines that will get humans back to beyond Earth's orbit for the first time in over 40 years. As CEO of Explore Mars, I am afforded the opportunity to work with NASA, academia, and industry that together are developing architectures our nation needs to regain access to deep space and get to Mars within our lifetimes. Explore Mars hosts several events every year to not only bring space exploration stakeholders together to review potential architectures, but these events also inform the public and our elected officials of how deep space exploration inspires innovation, technology development, and job growth throughout the nation—from large corporations to small businesses. We need to continue with this momentum and work with our elected officials to

ensure we continue on this Journey to Mars with NASA supported by America's small businesses.

In order to sustain this momentum, however, adequate funding is critical. But almost equally important is budgetary and policy stability. Without all three, it will be impossible to move forward.

Thanks to the support of Congress, NASA's funding has achieved some stability and growth recently. But only a few years ago budgetary uncertainty hit NASA and the space industry particularly hard—leaving the space community—including businesses, both big and small—in crisis and in a state of immense uncertainty. I recall meeting with a high ranking NASA official several years ago who didn't know whether his directorate's budget would be increased by \$2 billion or reduced by \$1 billion the following year. In other words, he had \$3 billion in budgetary uncertainty—which is a tremendously significant amount for any NASA directorate. Needless to say, this directly impacted industrial partners and subcontractors along the supply chain. Such uncertainty and fluctuations are especially tough on small businesses that often get hit the hardest by cutbacks. In this same timeframe, I was told by more than one of the major contractors that because of an unclear policy and budget director, they were forced to be very cautious about spending and investing funds, which results in a disproportionate impact to the small businesses in the supply chain. This is no way to run a long-term project, let alone a space program.

Space exploration is not JUST the business of large corporations—as I am sure will be made clear by the other witnesses. Small businesses play an essential role not just in the success of our space program, but in the nation's aerospace and defense industries overall. The major players in space procurement do not make all the nuts, bolts, pins, fabric, windows, switches, wiring harnesses and the other myriad parts in a spacecraft inside their own factories. These items are contracted out, much of it to small businesses that can make these parts in bulk at a much cheaper rate and for other customers as well. Unlike many other contracts, NASA contracts often have more value than just the 'dollar value' would indicate. An example if this appeared in an article in the *San Jose Mercury News* a few years ago. It highlighted the pride a worker felt for his contribution to the Apollo Program that landed humans on the Moon. He had not worked on life support, propulsion, or some other major system. He had installed some hooks that supported the astronaut's hammocks while on the surface of the Moon. Yet he felt, and rightfully so, that he had contributed to humanity's first voyages to the Moon.

One thing is clear: We must not allow the uncertainties of the past to prevail again. We must advance—and accelerate—into the next administration. There is strong bi-partisan support for the goal of sending humans to Mars, and there is clear excitement about that goal from the general public. We must harness that strong consensus.

We must *not* be "penny wise and pound foolish" with the NASA budget. It makes no sense to allow even a modest reduction in NASA's budget, while at the same time removing any prospect of

NASA achieving its mandate. Particularly when only a little more—and consistent—funding will serve the taxpayers in a manner that will provide tremendous benefits to our entire society and be remembered for millennia. There are not many federal programs that can achieve anything comparable.

We are approaching another major hurdle, and that is the uncertainty that traditionally accompanies a change in Administrations. Will we once again shift directions and throw our space program—and the small business community upon which its success depends—into turmoil, or will we fully embrace our current policy of sending humans to Mars? We have come so far in recent years, and it benefits no one if we radically change course again. Not NASA, not large businesses, not small businesses, and certainly not the taxpayers of the United States.

In closing, Explore Mars would like to thank you for taking the time to hold this hearing and highlight this nation's small business innovations! We WILL be sending humans to Mars in the very near future. And it will be accomplished in large measure based upon the support that we show for, and on the efforts of, those small businesses around the United States.

Again, thank you!

Testimony of
Dr. George W. Davis, CEO
Emergent Space Technologies, Inc.

before the
U.S. House of Representatives Committee on Small Business

Ready for Liftoff: The Importance of Small Businesses in the
NASA Supply Chain

July 12, 2016

Chairman Chabot, Ranking Member Velázquez and members of the Committee on Small Business, thank you for giving me the opportunity to speak to you on the importance of Small Businesses in the NASA Supply Chain.

Emergent Space Technologies is a 60-person aerospace engineering firm headquartered in Greenbelt, Maryland. With additional locations in Texas, New Mexico, Colorado, California and Virginia, we provide technical services and perform research and development for NASA, NOAA, the Air Force and DARPA. Our offerings include space mission design, development, and integration and test services, as well as flight and ground software technology development.

NASA is known for large, complex programs such as the Space Shuttle, the International Space Station, the Hubble Space Telescope and the Mars Science Laboratory, so one might think that only Large Businesses are capable of supporting its missions. In fact, Small Businesses form a vital part of NASA's contractor workforce. Simply look at today's engineering marvels: Orion Crew Vehicle, Space Launch System, James Webb Space Telescope and Mars 2020 rover, as well as dozens of smaller, lesser known programs. You will see that we are making unique contributions to NASA's most challenging missions.

Small Businesses typically start up around their founders' technical expertise. For Emergent, it was my background in spacecraft Guidance, Navigation and Control, or GN&C. GN&C is critical for any space mission, but especially for those that require, for example: precise pointing; rendezvous, proximity operations and docking; deep space navigation; and entry, descent and landing. NASA and its Large Businesses prime contractors once had a monopoly on GN&C expertise, but many of today's engineers, especially the younger ones, prefer smaller companies. This is also true for software engineering. When I started Emergent in 2001, I had taken a hiatus from the aerospace industry to work in the IT industry. It is there where I saw how modern software was developed. I

wanted to combine it with expert GN&C algorithms to help NASA and the Air Force enable autonomous space missions. This takes great software, so you need great software developers, most of which are lured to Silicon Valley, rather than NASA.

Emergent responded to this “scarcity of talent” problems by developing a network that spans both industry and academia and leverages modern social media such as Facebook and LinkedIn. As a result, we have found a niche in the aerospace industry by finding top talent in both GN&C and in software development, often in the same person. These are a rare breed, so you have to be intentional about your search. In this manner, Emergent, and Small Businesses like us, play a vital role in recruiting new and necessary talent to NASA programs.

Small Businesses are also critical sources of innovation for NASA. Over the last 20 years, NASA’s R&D budget has been drastically reduced. NASA’s budget is largely driven but its missions, and missions largely do not pay for R&D. They pay for low-risk, flight-proven space technology, particularly when it comes to the spacecraft bus, the launch vehicle and the ground system. As a result, NASA has increasingly relied on Small Businesses to come up with innovative solutions to challenging problems through the Small Business Innovation Research (SBIR)/Small Business Technology Transfer Research (STTR) program. Emergent is an active participation in this program, generating roughly 15% of our revenue. The SBIR-STTR program helps pay for NASA research while also creating good, high-skilled jobs for our economy.

Despite our role in the NASA Supply Chain, Small Businesses face many challenges. Chief among them is the diminishing supply of adequate Small Business Set-Asides, especially for *Emerging* Small Businesses. This is often driven by contract bundling, in which smaller prime contracts are combined with, or bundled into, larger contracts that are acquired under full and open competitions that only Large Businesses can realistically prime. While it might seem more efficient for NASA to do so, it is our experience that economies of scale generally do not apply to government contracting. More importantly, it takes away opportunities to grow from the Small Businesses, especially new ones and those without the “disadvantaged” designation. A good way to look at this issue is through the federal government’s use of NAICS codes.

The North American Industry Classification System, or NAICS, is the standard used by federal agencies in classifying businesses for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. economy. The Small Business Administration (SBA) has established Small Business Size Standards matched to the NAICS codes. The size standards are expressed in either millions of dollars or number of employees and specify how large a business can be and still qualify as a Small Business for federal government contracts. Engineering Services are assigned the NAICS code 541330, and the associated SBA standard limits the Small Businesses to \$38.5M in revenue when using the Military and Aerospace exception. Similarly, Custom Computer Programming Services are assigned NAICS code 541511 and this limits the

Small Business to \$27.5M in revenue. These codes are roughly equivalent to 150-200 employee companies, or 2-4 times the size of Emergent. The more frequently used standard for small-business set-asides is NAICS code 541712, or Research and Development in the Physical, Engineering, and Life Sciences. As of February 2016, this standard limits Small Business at 1,000 or 1,250 employees, depending on the requirement. This is 8-10 times larger than the standard set by the 541330 and 541511 codes. According to the U.S. Census Bureau's 2013 Statistics of U.S. Businesses, 99% of the United States' 5,775,055 firms have less than 500 employees. This seems inconsistent with the Small Business size standard set by NAICS code 541712, which limits Small Businesses to 1,000 or 1,250 employees!

I recently studied the NASA prime contracts whose primary requirements are science-, engineering- or software-related *and* are strategically aligned with our business capabilities and interests. There are roughly 50 such contracts. Of these, 60% are Small Business Set-Asides. That is the good news. The bad news is that over half are set aside with the 541712 NAICS code. Only 4 are set-aside using 541330 and 3 are set-aside using 541511, and these numbers appear to be dwindling over time. For example, a contract at NASA Kennedy Space Center was recently changed from a small business set-aside under 541330 to full and open competition. This contract has been successfully managed by Small Businesses for more than a decade, but was for some reason changed despite there being more than adequate competition.

The standards set by the NAICS codes and the way they are used by NASA to establish prime contracting opportunities for Small Businesses is important. In federal contracting, size does matter. The bigger you are, the lower your rates, which makes you more competitive in cost-driven competitions. Moreover, the bigger you are, the more personnel you can afford to develop your business opportunity pipeline and write proposals, which is the lifeblood of our industry. It is extremely difficult for companies of our size to compete with those that are 8-10 times larger, especially when you have so few chances to develop past performance experience.

Emergent and other Small Businesses like us have had to adapt to shrinking opportunities for prime contracting within by focusing more on subcontracting and also by looking to Department of Defense opportunities. For many companies, the latter is just not practical or even feasible. The downside to being just a subcontractor is that we have to work multiple proposals, usually simultaneously, just to increase the statistical likelihood that we maintain, not grow, our revenue. Losing contracts and therefore personnel can put you out of business.

Two changes that NASA could make to help us out are to (1) expand its use of small business set-aside under the 541330 and 541511 NAICS codes, and (2) use the size standard for *Emerging* Small Business, which is 50 percent of the NAICS standard. This would give more opportunities for companies like Emergent to gain experience as a prime contractor and grow our base so that we can

eventually pursue the larger set-asides that use the 541712 NAICS code. It comes down to risk versus reward. I can spend a tremendous amount of time and money trying to beat out a 1,000-person company for a prime contract, assuming I can assemble a credible team for the broad scope typically associated with these large contracts, or I can try to get on multiple prime contractor teams as a subcontractor teammate and hope we win one or more of the opportunities being pursued. In the latter case, I have little to no control over the destiny of my company.

Another challenge Small Businesses face in supporting NASA is the long-term stability of the SBIR-STTR program. Many U.S. Small Businesses rely on the SBIR/STTR program for seed funding in developing a unique product. Others, like Emergent, rely on it to perform strategic R&D for NASA, Air Force and DARPA. Ultimately this funding translates into jobs, both now and in the future. As Albert Einstein once said, “if we knew what we were doing, we would not call it research.” Congress can help Small Businesses by continuing its strong support of the SBIR-STTR program, especially when it comes to reauthorization in FY2020. Any delay or disruption in this vital program could result in the loss of thousands of job across the country. Specifically, for NASA, I would like to see the well-known “valley of death” problem addressed. As you may know, a Phase I SBIR contract is 6 months in duration and results in a proof-of-concept demonstration. A Phase 2 SBIR contract is 24 months in duration and results in a prototype. While the Phase 1 contract is being executed, however, the performing firm has to write and submit its Phase 2 proposal. The time it takes to evaluate and award the Phase 2 proposal takes months, causing a funding gap which in turn causes the Small Business to redeploy its personnel, or worse, lay them off. The Department of Defense SBIR/STTR program addresses this funding chasm by requiring the Small Business proposers to also bid a 4-month Option Period as part of their Phase 1 proposal. If awarded Phase 2, the Option Period contract provides continuity until the Phase 2 contract can be executed. This would prevent loss of revenue and valuable personnel, which as I have previously stated is not easy to find.

In closing, I would again like to thank Chairman Chabot, Ranking Member Velázquez and members of the Committee for giving me the opportunity to testify on the importance of Small Businesses to NASA’s Supply Chain. Working on NASA projects is a dream come true for me and my employees. It’s why we get up in the morning and go to work: to play a role, even a small one, in advancing our nation’s knowledge of the universe and in exploring our solar system. I have touched on some of the challenges in being a part of the NASA Supply Chain, and there is more that I could discuss that my brief time will not allow. I would therefore be happy to follow-up with you and your staff at your convenience. In the meantime, please continue to give NASA your legislative support.

Ms. Carol Craig, President and CEO of Craig Technologies, Cap Canaveral, FL

In 1999, I started Craig Technologies at my kitchen table. My husband is a Navy officer and our repeated moves and transitions led me down the entrepreneur path. By 2010, the company was successful, profitable and reputable. With revenues topping \$20 million and strictly organic funding, I knew there was more opportunity to serve both commercial and government clients with our brand of superior service. My foray into manufacturing started small. I had a need for quick and quality work and realized I could do it internally with the correct approach. Purchasing the assets of a small machine shop and investing wisely in supplemental equipment provided the company with a nimble production facility that quickly garnered interest from existing NASA supply chain members. When KSC leadership decided to pursue a Space Act Agreement with a company in order to take over the remains of the National Shuttle Logistics Depot, Craig Technologies bid on and eventually won the opportunity to house and maintain the manufacturing equipment for a period of 5 years and utilize it for any commercial purpose. Since that time, I made the conscious decision to utilize profits from the successful Engineering and Technical Services Division to fund the nascent Aerospace Solutions side. I did not utilize outside capital in order to preserve the culture and autonomy that makes Craig Technologies so different than other government contractors. We grew from \$20 million in 2010 to \$45 million today. We continue to provide outstanding service and product to all of our customers with NASA as the largest. As the commercial space industry grows around Cape Canaveral and KSC continues to pursue public/private partnerships through Commercial Crew and Commercial Cargo contracts, the future for astro- and aero-space manufacturing in Brevard County Florida is poised for explosive growth and relevant economic impact.

I tell you this back story because it leads to where I am today—at a crossroads of how to keep the manufacturing side afloat while waiting for delayed payments, extended NASA contract decisions and lack of access to working capital because of stringent banking regulations imposed by the Federal Government. **I've effectively robbed Peter to grow Paul.** I did so because it was the right thing to do—for our business, for our employees and for our community. I believe in our free market system and always strive to offer the very best product and/or service for the price agreed upon. Unfortunately, the cards remain stacked against a small business entrepreneur—even one who overcomes the odds and makes it to the next level. Unforgiving and uninformed covenants by lending institutions lead to myopic attitudes towards growth in the government sector and the milestones that point toward long term stability and success. Creating valuable employment opportunities in my community remains my number one goal and priority. But money has to come in the front door on a logical and planned timeline in order to properly budget and ensure the books remain solvent. Manufacturing built this country. We list it to cheaper and inferior overseas suppliers and then complained when the jobs went away. Now there are numerous folks like myself who are lay-

ing it all on the line to recover the industry. We need help and we need it now. We don't want handouts, but rather a fair and predictable system that ensures payments are made and contracts satisfied without political whim. What if more and more companies like myself are unable to succeed and close their doors. The impact on communities and our nation will be devastating.

NASA continues to explore and innovate. And their supply chain remains critical to both long and short term success. I urge you to report to the full body that commitment to a clear path and mission with 10 year budget cycles is crucial to the continuation of small business partnerships with NASA. And collaboration with lending institutions through small business offices within the agency will allow the banking world to understand the nuances of government contracting and work. Pursuant to your questions, I offer my thanks for your time.

**Written Testimony of Stephen Gorevan
Chairman and Co-Founder of Honeybee Robotics, Ltd.**

The Brooklyn Navy Yard
Building 128, Suite 121
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Subcommittee on Agriculture, Energy, and Trade
House Committee on Small Business

“Ready for Liftoff: The Importance of Small Businesses in the
NASA Supply Chain”

July 12, 2016

Mr. Chairman and Members of the House Subcommittee on Agriculture, Energy, and Trade:

Thank you for the opportunity to share our perspective as a small business contractor to NASA. We believe that NASA and small businesses have a strong and mutually beneficial relationship. Organizations such as ours play an important role in creating enabling technologies for NASA while doing our part to keep American innovation the envy of the world.

I co-founded Honeybee Robotics in 1983, and my company has worked as a small business contractor to NASA for 30 years. Our headquarters is in New York, and we maintain satellite offices in Longmont, Colorado and Pasadena, California. Our specialty is in building robotic and electromechanical systems that operate reliably in the toughest environments, such as planetary exploration and spacecraft systems. Over the years we have worked with the majority of NASA’s research and space flight centers, winning contracts for pioneering early-stage development as well as flight missions that range from planetary exploration to the Orion spacecraft.

We have been fortunate to contribute flight hardware to all the spacecraft that NASA has landed on Mars since 2000, and in the process Honeybee has achieved a succession of firsts on Mars. Our Rock Abrasion Tools on the 2003 Mars Exploration Rovers *Spirit* and *Opportunity* were the first tools to access the inside of rocks on Mars. The Rock Abrasion Tool on *Opportunity* is operating in its thirteenth year, some fifty times its original mission life. Our Phoenix scoop for the 2007 Phoenix Mars Lander was the first tool to sample water on Mars. Our Sample Manipulation System for the

2011 Mars Science Laboratory acts as a robotic laboratory assistant, moving samples to the rover's instruments so it can detect even traces of molecules associated with life. We designed and built all these systems in our New York headquarters—and as a lifelong New Yorker, I would venture that our facility's clean room was the most pristine place in all of New York City.

Flagship manned space programs such as the Space Shuttle and Orion are certainly important in providing opportunities for the small business community, but NASA has set up a robust system for technology development outside these high-profile programs. From our perspective, the opportunities for small businesses outside these flagship programs—in areas such as Earth Science, Planetary Science, and Exploration Research and Development—are more numerous and in some ways more important for the sustained attention necessary for technology development. As a result, I would encourage the members to consider the effects of all NASA's programs, not only its highest-profile human space missions, in considering how small business can support NASA's mission.

The Small Business Innovation Research (SBIR) program is an excellent mechanism by which small businesses are encouraged to deliver relevant technologies to NASA in a competitive manner. NASA also supports many other specific funding mechanisms that allow small businesses to grow and commercialize new technologies. The funding in these contracts is almost always spent quickly by the contracting company on skilled domestic labor, materials, and direct expenses. We believe this is an effective use of public resources to spur economic activity and innovation.

Honeybee Robotics is a testament to the mutually beneficial relationship between NASA and the small business community. But, there are areas for improvement that will serve three purposes: to deliver better technologies to NASA; to strengthen the growth and commercial prospects for innovative small businesses; and to maintain the technology and economic leadership of the United States into the next generation and beyond.

In preparing this testimony, Honeybee consulted several of our friends and business associates in the small business community. The statements to follow affect many of us, and reflect a shared perspective of ways that NASA could enhance the ways it engages small businesses. The goal is to level the playing field such that small businesses can compete with larger companies on technology and cost-effectiveness so that NASA can be as successful in its mission as possible.

First, the ability for small businesses to develop and deliver relevant, cost-effective technology is highly dependent on long-term mission clarity. As resource-constrained organizations, we are sensitive to the prospect of developing technologies for missions that are cancelled in the next political cycle. The preparation and execution of mission requirements can take a decade or longer. It is exceptionally difficult to develop a technology to flight readiness.

Unfortunately, when a small business does manage to get its technology selected for a flight program, the uncertainty, delays,

and outright cancellation of funding remains a very real risk. Sometimes these delays are a result of Congressional budgeting, such as continuing resolutions that delay funding. Sometimes funding is at risk due to reductions in directed expenditures, the effects of which can flow through prime contractors and lead to small businesses losing subcontracts. And sometimes interruptions are a result of inconsistency in program development roadmaps, which can lead to long breaks between program stages that cause small businesses to lose talent and momentum while they wait months or years for the next phase to take effect. The net effect of uncertainty is that too often the small business contractors for NASA bear the risk and pay the price when Congress or the Executive branch changes the priorities it directs NASA to focus on.

Second, I want to highlight the headwind small businesses face when they seek to develop flight technologies or commercialize systems through contracts that require private matching investment. I would recommend such investment be eliminated for small businesses due to the chilling effect it places on technology development and the inherent advantages more highly capitalized businesses have in this situation.

As an example, NASA's 2016 Next Space Technologies for Exploration Partnerships (NextSTEP) is a public-private partnership model that seeks commercial development of space exploration capabilities for human missions beyond low-Earth orbit. This Broad Agency Announcement solicitation requires a minimum cost sharing threshold, i.e. private company investment, for businesses to be eligible. The details of this requirement pose problems. The solicitations often restrict the eligible in-kind investment to resources spent within the last year, so investments from years prior are not considered. They also require that a portion of the actual contract contain a matching investment (such as 50% of the investment must be made during execution of the contract). As a result, NASA is limited in the size of the award it can grant to a small business with relatively little capital to invest, independent of the value that NASA would get from the technology.

Some form of private investment requirements can make sense for a device or technology that can be utilized in other industries, where a small business can make a ROI calculation. But in practical terms, much of the technology for space exploration does not have immediate commercial application. The effect of the cost-sharing model is to box out small businesses in favor of more highly capitalized large businesses that have more significant R&D budgets, even if those businesses do not make as efficient use of NASA funds for technology development.

I would suggest that Congress consider the benefits of making small businesses exempt from the "in-kind" contribution requirement that now discourages and limits small, innovative companies from participating in projects that NASA has identified as important to its mission. To further enhance the extent that small businesses can participate, I would also suggest that the amount of money a large company contracts to a small business be directly deducted from the large company's contribution requirement. The

effect of this change will be that large companies gain an incentive to work with small, innovative companies. Another option would be to include any money NASA has invested in SBIRs as deductible from a small business's private contributions, which is consistent with the spirit of the SBIR program and NASA's charter to encourage industry and innovation.

Finally, with regard to the SBIR program, I would make two recommendations to strengthen this program that has proven critical to both small businesses and NASA alike. Neither requires new appropriations for Federal research and development budgets.

First, the SBIR program is budget-neutral, but a critical source of funding for small business innovation. I recommend that Congress increase the share of funding that Federal agencies allocate to SBIR from the current sub-3% up to 5%, with increases enacted gradually over the next decade. The most effective use of these funds would be to direct most of the increase to maturing technology after the initial Phase II program. Small businesses such as Honeybee face what's known as a "valley of death" between Phase II, when we have a functional prototype, and commercialization or flight readiness. It is rare for us to find an immediate need at NASA where our SBIR-funded technology satisfies a specific problem. Instead, often the technology waits for a mission, or requires more investment to prove viability in a commercial or NASA application. Enabling a transition to greater technology development after Phase II, rather than straight to commercialization, would help small businesses contribute more to flagship projects.

Second, the SBIR program's success depends on the ability to match NASA's needs with the capabilities of small businesses across the country. Unfortunately, it can be challenging for small businesses to understand the details of a technology request that NASA issues based solely on the written solicitation. NASA currently institutes a communication ban between companies and the Contracting Officer's Technical Representative once it issues the solicitation of SBIR and STTR topics. Our understanding is that the intent is to prevent one organization from gaining an unfair advantage with information not available to the larger community.

On the other hand, organizations such as the Department of Defense have found a way to share information with a pre-release of SBIR topics. During the pre-release, small businesses have one month to ask questions about the technology and how it fits into larger programs before the communication blackout takes effect. This enables the small business to better match its technology with the goals of the organization and present higher-quality development plans. We recommend NASA follow suit by opening communications on SBIR topics for a reasonable period before instituting a ban on contact outside the formal proposal response channels.

In light of my suggestions above, I want to emphasize that for small businesses, NASA remains one of the Federal government's most supportive organizations. I believe NASA understands the ways in which the small business community can help it succeed with its mission, and it takes seriously its mandate to provide opportunities for small businesses such as Honeybee Robotics to

thrive. We are excited for what the future holds and, along with our small business colleagues, look forward to the exciting and important missions ahead.



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July 11, 2016

The Honorable Carlos Curbelo
1429 Longworth HOB
Washington, DC 20515

Subject: Matrix Composites Inc. – A Small Aerospace Manufacturer on Florida's Space Coast

Dear Congressman Curbelo:

The purpose of this letter is to introduce you to Matrix Composites, Incorporated and to highlight the positive impact Commercial Space has had on the industrial base.

Matrix Composites was established in 1993 and is a privately-held, self-financed start up focused on the manufacture of critical components for Aerospace and Defense. Growing from just several employees in 1993 to over eighty (80) in 2007, Matrix successfully established itself as a key Aerospace supplier on both the F22 Raptor and Space Shuttle Programs.

In and around 2009, we saw a 60% decline in our General Aviation business due primarily to the housing market crash. In addition, the F22 Raptor and Space Shuttle programs were both terminated. Matrix was forced to reduce its highly skilled staff by 56% due to the combined business downturn.

Since that time, we have worked diligently to "reinvent" the company while maintaining our unique aerospace manufacturing capability. Part of the "course correction" included a heightened focus on Commercial Aerospace and more specifically, Commercial Space.

In 2014, Matrix was fortunate enough to secure its first contract with SpaceX (Hawthorne, CA). We now supply over 150 components on each Falcon 9 launched. Although we are hopeful to see the return of Defense and Government Space Missions, I can attest that without the expansion of Commercial Space and the trickle-down affect it has on small aerospace businesses like Matrix, it would be difficult (if not impossible) for us to sustain our aerospace production capability.

We strongly encourage this Subcommittee to continue its support of Commercialized Space. The impact Commercial Space has on Florida-based small businesses will help retain the diminishing aerospace industrial base and assure readiness to support future Government Space Missions and endeavors.

Thank you for your time and efforts. Please feel free to contact me with any questions.

Sincerely,

David A. Nesbitt
President

Design. Development. Testing. and Manufacturing of Composite Structures

