

**REMARKS FOR ADMINISTRATOR BOLDEN
SPACE COMMERCE CONFERENCE AND EXPOSITION**

Nov. 17, 2015

Thank you all very much. It's great to be here with so many leaders of the aerospace field to help kick off the Space Commerce Conference and Exposition (SpaceCom).

NASA and its partners have reached a lot of milestones in recent months in commercial space and our impact on the business of this nation is wide and deep.

Just for starters, I think most of you are aware of the scope of our work with commercial partners, but to be precise, our commercial crew work is taking place right now in 35 states with 350 partners. I find that pretty incredible, and that's just one facet of our efforts.

Many of you probably know that Suni Williams, Eric Boe, Doug Hurley and Bob Behnken are also the first astronauts training to fly aboard commercial crew vehicles.

I know The Boeing Company and SpaceX are as excited as we are to get the *Starliner* and the *Crew Dragon* into space and let me assure you we're on the cusp of launching our own astronauts from American soil once again.

That's long been our goal since the retirement of the shuttle, but our work in commercial space, as I said, has much deeper goals than that one – admittedly huge – item on our agenda.

If you've been involved at all with NASA lately, you know that we're on a journey to Mars.

Each of us, as individuals, has a role to play in making this journey possible. At NASA we recognize that by working together across sectors (and across countries) we will reach our goal of sending astronauts to the Red Planet in the 2030s.

So we are actively seeking out partners: Industry partners; international partners; academic partners; citizen scientists and the public at large.

Today, there is a new consensus emerging in the scientific and policy communities around NASA's strategy, plan and timetable for moving our Journey to Mars forward.

We have a concrete plan with distinct phases and steps. I'd encourage you to read about it online at NASA.gov (*Journey to Mars* dropdown). I think you'll find that our plan is clear; it's affordable and make no mistake – it's attainable.

Our strategy is designed around three stages and in each stage there are significant business opportunities.

The first stage is what we call an “Earth reliant stage.” The second is a “proving ground stage.” The third is an “Earth independent stage.”

I’m not going to go into great detail about each of them, but suffice it to say we’ve been engaged in the Earth-reliant stage since the beginning of the Shuttle Program and really intensified our efforts with continuously living and working on the ISS over the past 15 years. Then, as we move farther out with *Orion* and the Space Launch System to begin operations in cis-lunar space, we’ll be testing new technologies in the proving ground of deep space. Finally, when we move out to humans in the Martian environment, we’ll have become Earth independent, with very little help from Earth and significant delays in communications (which of course we’re working on decreasing).

It may not be immediately apparent how commercial cargo and crew fit into this path, but they're definitely integral to our entire strategy.

With the success of our partners in commercial cargo, we were able to ensure that the International Space Station could be resupplied with provisions as well as new research and equipment through its extension to 2024.

Along with commercial crew, which I'm confident will be just as successful, we've freed up NASA to focus on the farther horizons, sending astronauts in *Orion* on the Space Launch System to cis-lunar space, an asteroid and on to Mars. It's freed us up to allow technology to drive that exploration so we can work on solar electric propulsion, better life support system, habitats and the like.

Our list is long and most of it, I'm happy to say, is already on the drawing boards and even in development. But if we were still owning and maintaining the systems to get to low Earth orbit, it would be much harder for us to actually use the space station as the springboard to the rest of the solar system that it is right now. So I'm very excited for Suni, Doug, Eric and Bob. They'll be the first, but far from the last. I'm sure most of you have seen by now that we're looking for more astronauts with the application for the Class of 2017 opening next month.

Do you know anyone who might want to come fly with us? We're expecting huge numbers to say yes! The last call resulted in the second highest number of applications ever and I think we're even more embedded in the public consciousness now with our connection to the movie *The Martian* making a lot of people realize we're closer to Mars than we ever have been before.

Not to mention the enormous global interest in *New Horizons* reaching Pluto and new discoveries about flowing water on Mars as well as how the Red Planet's atmosphere has been stripped by the solar wind.

Those are just a few of the things that are getting play on the evening news as well as in the science and technology journals. So the general public knows we're going to Mars and they know people are still exploring space.

More and more, they're seeing the effect of a growing commercial space sector. In partnership with government and on your own, there are some mighty big ideas fermenting out there.

As we focus on sending humans to Mars, it will likely be commercial companies and international partners who assume a lead role in taking humans back to the surface of the moon and I'm all for it!

Now that the door to low Earth orbit has been kicked open, I'm looking forward to your ideas about what we do next and how we keep that market humming. Who has a plan for non-NASA astronauts to conduct low Earth orbit ops – a critical question that I'm not certain is receiving sufficient thought?

As we move farther into space, commercial opportunities will begin to develop in cis-lunar space and beyond. We're at the earliest stages of looking at that and a lot of you have responded to our Broad Area Announcements looking for ideas. So keep thinking.

Like the old science fiction movies used to say, "Keep watching the skies!" Keep watching what's happening in space because it's moving fast and there are a lot of opportunities.

Our path to Mars goes straight through Houston, but it's a national and international effort as well. It was one of the more significant space anniversaries when two weeks ago we celebrated 15 years of continuous human habitation aboard the ISS. That would certainly have been science fiction when I was a child and maybe when most of you in this room were as well.

Over this period of time, 220 people from 17 countries have visited the unique microgravity laboratory that has hosted more than 1,700 research investigations from researchers in more than 83 countries. More broadly, for more than 50 years, almost all of NASA's major programs have benefited from some level of international cooperation. In fact, NASA currently has more than 700 active international agreements with organizations in more than 120 countries.

Our researchers have identified more than 1,800 technologies that have been spun-off from NASA activities that are putting

Americans to work and improving our health, safety and quality of life right here on Earth.

As we speak today, NASA is partnering with American businesses on everything from 3D Printing to high performance computing to small satellite technologies like “CubeSats.”

It goes without saying that the further along we get on our Journey to Mars, the more opportunities there will be for companies and organizations like those represented in this conference to partner with us, and I believe there will be tremendous commercial opportunities associated with these efforts in cis-lunar space.

The solutions to our challenges on this journey will not invent themselves. Nor will they fund themselves.

While NASA's employees and contractors will develop many of them, we will need the help from our partners.

We have a number of initiatives that make funding available to companies that are willing to match them with their own resources as they advance the technologies that will help us get closer to our goals.

As I mentioned, last year around this time, we issued what's called a "Broad Agency Announcement," which is basically an open casting call for proposals from the business community. We asked for concept studies and development projects in advanced propulsion, small satellites and habitation systems.

This past spring we announced seven recipients of what we call "NextSTEP" awards for companies working on habitation systems.

The idea is that these habitats would initially be able to sustain a crew of four for a few months in cis-lunar space and eventually could evolve into a habitat in which astronauts can live and work on a long duration mission like a journey to Mars.

We also anticipate that this work will fuel additional commercial space activity in low Earth orbit ... paying it forward as well as paying it back.

But our partnerships add up to a lot more than dollars and jobs, although that's certainly critical. At the end of the day, I truly believe it's the inspiration we give to the future generation and the spirit of peaceful cooperation that we engender across borders with nations of all kinds that will form a lasting legacy as important as technological breakthroughs.

You know, sometimes, an innovator is a pathfinder with such breakthrough ideas that eventually, the person who had the eureka moment may be lost to the sands of time as their ideas go forward because they are so widely adopted.

I think we may be at a point where in the years to come, people will take it for granted that humans live and work in space and travel to other planetary bodies.

Already, for youngsters 15 or younger, what I call the Space Generation, they have never known a time – not one second of their lives - when humans have not lived and worked on the International Space Station. Long after my generation has passed, perhaps as early as the generation of my three granddaughters, the work we do today will be so much a part of people's lives that it will have become integral to the human experience.

Space flight will ever be easy, and I don't mean to say we should work toward it being taken for granted, but I do think the huge growth in our endeavor and the number of people wanting to take part, is having a cascading effect that is truly astonishing and historic.

At this conference alone, I'm so proud of the huge array of fields and expertise coming together to dialogue, because what we do truly does tie together the whole of humanity. We are positively impacted from the awe inspired by new technologies and new discoveries, to good jobs, to improvements in life worldwide and medical and manufacturing breakthroughs that spinoff from our work, to a hope for a better tomorrow.

Each day, we're all making that happen. From the astronaut stepping out of an airlock to prepare the Station to accept commercial crew vehicles, to the engineer in Middle America

designing an instrument to go to Europa, which is still years away from reaching space.

All of us are in the future business. It's driven by innovation, entrepreneurship and the sheer audacious belief that we CAN get there from here.

I applaud all of you for your hard work. Your innovation is inspiring and invigorating. Together, we are changing the world, so keep it up!

Thank you.