

**REMARKS FOR ADMINISTRATOR BOLDEN**  
**NORTHERN VIRGINIA TECHNOLOGY COUNCIL**

Nov. 14, 2011

Thank you for inviting me to join you this evening, and congratulations on your 20<sup>th</sup> anniversary.

I'd like to thank the Virginia congressional delegation for their support of innovation in Virginia and the jobs and advancement it brings the nation. Sen. Mark Warner is with us tonight. He and Congressmen Frank Wolf and Jim Moran and others have been champions of high tech in Virginia for a long time and have each supported our efforts to standup our technology development program at NASA.

You know, it may seem obvious, but technology has never been more important to NASA than it is now.

For years we've known pretty much the kinds of things we would need to undertake missions to destinations farther in the solar system – things like a heavy lift rocket; revolutionary in-space propulsion; closed-loop life support; and many others. The National Research Council documents them and other new technologies in our Space Technology Roadmaps currently under review. These roadmaps consider a broad range of pathways to advance the nation's current capabilities in space and serve as an initial point of departure for mapping NASA's future investments in technology. Presently, budget and mission constraints precluded us from pursuing many of them in a meaningful way.

Now, with the retirement of our flagship space shuttle program, we are pursuing the capabilities to undertake the most challenging missions of our history. We are opening a new chapter in the history of exploration and it has already begun.

American technological leadership is paramount today, vital to our national security, our economic prosperity, and our global standing.

The United States is the nation we are today because of the technological investments made in earlier decades. American engineers, scientists and elected officials had the wisdom and foresight to make the investments required for our country to emerge as a global technological leader.

These past investments accelerated our economy through creation of new industries, products, and services. They have yielded lasting societal benefit.

Aerospace remains a strong component of our national fabric and is the largest positive contributor to our nation's trade balance. But to maintain American technological leadership, we

must continue to invest in the technologies and the people who will create the breakthroughs of tomorrow.

As many of you know, about a year and a half ago, NASA established the Office of the Chief Technologist (OCT). The primary challenge for the OCT is to help us prioritize our technology investments.

I have tasked the Chief Technologist to work with our field centers and the technology industry at large and help us start getting some momentum developing capabilities that will be applicable across a wide range of missions. His focus is also to infuse a good dose of thinking outside the box.

Our first Chief Technologist, Dr. Bobby Braun, has just returned to his home base at Georgia Tech, but he did a great job getting us out of the gate and initiating a lot of programs that will have lasting impacts in the years to come. We've just named his

successor, Dr. Mason Peck, a Cornell University professor who is going to help us coordinate, track, and integrate technology investments across the agency and work to integrate innovative discoveries into future missions.

You, the technology leaders and innovators of this key region of our country, are at the forefront of this new frontier. I think you all know, in your wide-ranging specialties, that it's not just about fire and smoke from rockets, although just last week we did hold the longest test-fire yet of the J-2X engine in Mississippi.

That engine will power the second stage of our new Space Launch System, or SLS, that will carry astronauts beyond low Earth orbit to asteroids and Mars.

In addition to the things you think of immediately when you hear about NASA, like rockets and astronauts and Mars rovers, we've been working on an array of things that will lay the

groundwork to achieve the new heights that President Obama has envisioned for us in the coming decades.

For instance, our NASA Institute for Advanced Concepts, or NIAC, has selected 30 proposals from hundreds of submittals. These early-stage concepts address challenging problems in space operations research and development. They're the kinds of things that might have seemed like science fiction a few years ago, but are now well within the realm of possibility.

In Phase One, we selected proposals across a broad range of imaginative and creative ideas in areas such as: changing the course of dangerous orbital debris; a spacesuit that uses flywheels to stabilize and assist astronauts as they work in microgravity; the use of 3-D printing to create a planetary outpost; and multiple innovative propulsion and power concepts needed for future space mission operations.

NASA's early investment and partnership with creative scientists, engineers, and citizen inventors from across the nation will pay huge technological dividends and help maintain America's leadership in the global technology economy.

We solicited visionary, long-term concepts of future technologies for maturation based on their potential value to NASA's future space missions and operational needs. These first NIAC projects were chosen because they were technically substantiated and very early in development -- 10 years or more from mission infusion.

When you think in the long-term like we do, with missions that can take years to reach a destination, this is not really that long a period of time.

We've also selected the inaugural class of 80 in our Space Technology Research Fellowships. These talented graduate

students come from 37 colleges and universities to help us win the future through their energy and enthusiasm.

They're the leaders of tomorrow; the ones who will be helping us put boots on Mars and mount the challenging science missions to new destinations in our solar system and to peer beyond its boundaries.

In other areas, through our Green Flight Challenge we recently awarded a prize to Pipistrel-USA for its electric plane demonstration. Our Game Changing Development program has seeded research and technology development for revolutionary improvements in America's space capabilities such as a Lightweight Composite Cryogenic Propellant Tank.

Our Flight Opportunities program has selected seven companies to integrate and fly technology payloads on commercial suborbital reusable platforms. We envision a time

when we launch many more of these to demonstrate technologies in microgravity.

We've also initiated our Technology Demonstration Missions -- a vital element in NASA's space technology maturation pipeline.

They prove feasibility in the environment of space and help advance innovations from concept to flight so that they can be infused into future missions.

We selected three proposals this year that will transform space communications, deep space navigation, and in-space propulsion capabilities.

At the Goddard Space Flight Center, a team is developing a laser-based, deep space communications system that will revolutionize the way we send and receive data, video, and other information.

This system uses lasers to encode and transmit data at rates 10 to 100 times faster than today's systems that will be needed for future human and robotic space missions

A little farther afield, at NASA's Jet Propulsion Laboratory, a team is developing a Deep Space Atomic Clock that will dramatically improve navigation and guidance in future deep space missions, and may lead to improved GPS utilization here on earth.

Also in California, a small technology company named L'Garde is developing a solar sail that is seven times the size of any previous solar sail flown in space, to show that realistic payloads can be carried and in-space navigation can be performed using this fascinating technology that uses photons from the sun to generate a propulsive force and thereby provide propellantless thrust for deep-space missions.

By investing in such high payoff, disruptive technologies that industry does not have in-hand today, NASA will mature the technologies required for its future missions while proving the capabilities and lowering the cost for other government agency and commercial space activities. While we do have specific mission objectives in mind for these technologies, we're also conscious that they motivate new business opportunities and create high-tech jobs in areas both inside and outside the aerospace industry.

We're looking at flights for the solar sail, optical comm system, and the atomic clock in 2015 and 2016. I might point out that these are the years when we arrive at Pluto and Jupiter respectively with robotic spacecraft. Our big picture means innovation across the board, not only in human space flight, but also in our science missions and aeronautics.

For our science missions, consider the improvements from new optics, lightweight materials, structures, power systems, and high-bandwidth communications.

Consider the efficiency gains in radiation shielding and closed loop life-support systems that may become possible from improved knowledge of human adaptability to the space environment gained through scientific experiments on the International Space Station.

At JPL and the Langley Research Center, engineers are working to develop lightweight planetary entry systems that will enable large mass, high elevation and pinpoint landing capabilities required for Mars and other planetary destinations.

You may have seen Robonaut, or R2, as we call him, the robotic space station crewmember we developed with General Motors. At the Johnson Space Center, a team is working to build

on the Robonaut 2 demonstration on the International Space Station and further NASA's development of next-generation tele-robotics systems.

Locally, three companies have been innovating with us in aeronautics:

- The Goddard Space Flight Center and West Virginia University enabled Aurora Flight Sciences Corporation of Manassas to develop cost-effective composite manufacturing capabilities and open a facility in West Virginia. The company now employs 160 workers at the plant to craft airframe components for the Global Hawk unmanned aerial vehicle, or UAV, program.

- To help air traffic control centers improve the safety and the efficiency of the National Airspace System, Ames Research Center developed the Future Air Traffic Management Concepts Evaluation Tool, or FACET, software. Ames licensed FACET to Flight Explorer Inc., of McLean for integration into software to help alert airspace users to forecasted demand and capacity

imbalances. Advance access to this information helps dispatchers anticipate congested airspace and delays at airports, and decide if they need to reroute flights.

- With small business contracts from our Ames Research Center, Mosaic ATM of Leesburg created software to analyze surface operations at airports. Mosaic's Surface Operations Data Analysis and Adaptation tool is an off-line support tool that can analyze how well the airport surface operation is working and help redesign procedures to improve operations. It helps researchers pinpoint trends and correlations in vast amounts of recorded airport operations data.

I want to emphasize that we are working with companies large and small – new and established players – on all of these things. We're working to get the best, most innovative ideas and enable our ambitious plans for the future.

Our needs are unique, and the complexity of our systems is ever increasing. We have challenges no one else in government faces. No one else is sending a rover to Mars to look for the possibility that the Red Planet might have once been hospitable to life, for instance, as we are on the Friday after Thanksgiving.

No one else is upgrading telescopes in space with new instruments far beyond the capabilities of the originals. No one else is constantly monitoring the vital statistics of human beings living in space. No one else is processing hundreds of terabytes of data about the moon from just one satellite.

We have always faced a need to acquire systems that are truly breaking the boundaries of what has been done before.

NASA doesn't just acquire technology, however, we also help innovate new paths.

So as we forge the path to the future, we're also looking at new ways of doing business -- streamlining our work and strategically focusing it.

We're at a historic point in the space program, but we have to remember that government investment has fueled innovations in the past such as the commercial aviation sector and a host of technologies that have improved air travel and telecommunications, developed GPS technology and remote sensing, and enabled human space flight in the first place.

Government investment in research – in innovation – has a cascading effect. We're achieving big things and the ripples spread out with great human and economic benefits.

Our Chief Technologist, Chief Scientist, and many others across NASA and throughout industry – not to mention those innovators working in their own shops and in university labs – are helping us

implement a wide array of programs to make these things happen.

By investing in space technology research, NASA can be a significant part of the solution to our nation's economic, national security, and geopolitical challenges. Our Space Technology Program and indeed the innovation surrounding the full range of our missions and programs will act as catalyst throughout America's aerospace industries and create new, high technology jobs and innovations in manufacturing that will guarantee American leadership in the new technology economy.

I know I've covered a lot of ground here tonight, but I want you to see the broad range of our work and I hope you can see yourselves as part of our efforts. Not only here in Northern Virginia, but across the nation, our hopes and dreams for the future are taking shape right now with the technology companies that are helping us open that next great chapter of exploration.

Thank you!