

**Remarks by The Honorable Shana Dale
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Before the
AAS/AIAA Seminar
"Importance of International Collaboration in Space Exploration"
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Thank you for those kind words and thank you for inviting me to this seminar today. These are exciting and busy times in the space business and I firmly believe we should continue vigorous and healthy dialogue about how we conduct space exploration with our international partners. To that end, Mike Griffin gave a speech last month at the International Astronautical Congress highlighting both the importance that NASA places on international involvement in our programs and some of the key issues that we must address as we proceed together into a new era of space exploration. Some observers described Mike's speech as "uncharacteristically blunt." I think that we can all agree that an open and honest dialogue about our nation's goals for international collaboration in space exploration is exactly what is needed in order to make progress going forward.

It is fitting that this seminar be held on a George Mason University campus. I appreciate the wisdom that George Mason imparted to our nation. He was a blunt speaker and the lead author for the Virginia Constitution and Declaration of Rights, whose philosophies formed the basis for our national government's role in protecting individual rights, liberties, and properties in the Bill of Rights of the United States' Constitution. George Mason enjoyed a vigorous debate about our nation's future and our nation's role in the world.

Our founding fathers had great challenges before them, just as we have today. Space exploration, whether human or robotic, is still the grandest and most technically challenging expression of human imagination. Thus, George Mason's 18th century wisdom still has relevance to us today when we recall his words, "A few years' experience will convince us that those things which at the time they happened we regarded as our greatest misfortunes have proved our greatest blessings."

This saying holds especially true when considering the Hubble Space Telescope. Yesterday, we announced our decision to proceed with another Shuttle servicing mission to the Hubble. Based on what we have learned and developed in the wake of the Space Shuttle Columbia accident, extensive reviews from the last three Shuttle missions, and careful consideration of the risks, costs, and potential scientific benefit of such a Shuttle servicing mission in extending the life of the Hubble, we decided to proceed. It was a carefully considered decision, but the right one to make.

The Hubble Space Telescope has an amazing history. The idea for a space telescope was first proposed in 1923 by German rocket scientist Herman Oberth to avoid cloudy nights of observation of the Earth's atmosphere, and Lyman Spitzer advocated for such an "extra-terrestrial observatory" in the 1940s. It took many decades before technology caught up with this idea. The telescope was carried onboard the Space Shuttle Discovery in 1990, and soon after

its on-orbit checkout, astronomers discovered a slight aberration in the mirror's curvature that was far less than the width of a single human hair, but it still prevented the Hubble telescope from producing sharp images from the edge of the visible universe. Thus, in December 1993, astronauts repaired the Hubble with small corrective mirrors. It has been repaired and improved three other times in the intervening years by our Space Shuttle crews.

The Hubble Space Telescope has made some of the greatest discoveries in the history of astronomy. The Hubble also stands as a testament to perseverance and cooperation between NASA and the European Space Agency. Two separate aims of our Vision for Space Exploration are to conduct advanced telescope searches for Earth-like planets and habitable environments around other stars and pursue opportunities for international cooperation in carrying out NASA's mission. To that end, we're working closely with ESA on the James Webb Space Telescope. Our European partners are providing instruments for the observatory and an Ariane 5 launch vehicle to get it into orbit. The Canadian Space Agency is building the satellite's guidance system, and, of course, the lead project scientist for the Webb Space Telescope is NASA's first civil servant to win the Nobel Prize, Dr. John Mather!

Our international cooperation does not start or end with the Hubble and JWST missions. Of NASA's 42 on-going space and Earth science missions, over half of them have international participation, and of those NASA missions under development today, almost 2/3 have international involvement. The astronomy and astrophysics community should be proud of how we are leveraging the investments in this great enterprise.

NASA astronomers are working with CNES, the French Space Agency, for imagery and insights to be gleaned from the soon-to-be launched COROT space telescope to survey extra-solar planets with periods of less than 75 days. In a few years, NASA's Kepler space telescope will survey such Earth-like planets with periods of less than one year – or – what is considered a habitable zone for extra-solar life. Then, ESA's ambitious GAIA mission not only will chart a three-dimensional map of our Milky Way galaxy, but it also should help detect and classify tens of thousands of extra-solar planets.

Looking at all of these efforts along with many ground-based telescope efforts, astronomers have certainly entered a Golden Age of Discovery when it comes to the search for extra-solar planets. That being said, NASA simply cannot afford every mission that every astronomer would like us to do as soon as they would like us to do it. With significantly underestimated costs for the James Webb Space Telescope, additional costs for the next Hubble Servicing Mission and continuation of the SOFIA program, we decided the best course was to turn the Space Interferometry Mission and Terrestrial Planet-Finding missions into technology development efforts for the time being. That carefully-considered decision was based in part on the fact that the SOFIA mission is more highly ranked in the National Academy of Sciences decadal survey for astronomy missions than the SIM mission.

This past year, I worked closely with Professor Sigmar Wittig of DLR, the German Aerospace Center, and others to address the management challenges associated with the SOFIA program. Based on our careful review of SOFIA and working with our German partners, I believe we're tackling the challenges of this troubled, yet executable, program. When it is

operational, this mission will provide the astrophysics community with regular access to the largest airborne observatory in the world, and will make observations that are impossible for even the largest and highest of ground-based telescopes.

With the largest hole ever put into the side of a 747, the SOFIA aircraft is, most definitely, an experimental aircraft, and it is for this reason that NASA's Dryden Flight Research Center has taken over management of the aircraft. At NASA, we are attempting to find the best match between the work and the skills available at our field centers. Dryden has the experience necessary in making complex modifications to research aircraft, and thus, has the expertise to get the job done in testing and check-out for such an experimental aircraft, while working with the project scientists at Ames.

The Hubble Space Telescope, JWST, and SOFIA are just a small part of NASA's mission of scientific discovery currently underway with our international partners. I would like to spend the rest of my time here speaking to how to build on the framework for international cooperation already begun by NASA's science community and International Space Station partnership. One of the greatest values from the ISS partnership is the partnership itself. For this reason, the Vision for Space Exploration honors existing commitments with our international partners, while committing NASA to new endeavors with our international partners. This will not be easy—completing assembly of the ISS; retiring the Space Shuttle; building the Orion CEV, Ares launch vehicles, and lunar landers; returning to the Moon and setting a course onward to Mars—the Vision for Space Exploration is NASA's greatest challenge. But, as President John Kennedy said at Rice University in 1962, we do these things, “not because they are easy, but because they are hard.”

Thus, we look forward to working together with our international partners in this endeavor. We seek to build on our ISS partnership and scientific collaborations in exploring the charted and uncharted territory on the Moon and Mars. We also want to try to bring other countries into our framework for cooperation, such as the fruitful collaboration currently underway between NASA and the Indian Space Research Organization which is hosting two NASA payloads on their Chandrayaan-1 spacecraft to the Moon.

The first step in this process had to be development of the Exploration Systems Architecture Study, under Mike Griffin's leadership. The Study developed the basic space transportation elements now known as the Orion Crew Exploration Vehicle and the Ares launch vehicles. We are now in the initial phase of the process to design, develop, and test these vehicles. As a parallel activity, with your help, we are now in the process of developing our strategies for what lunar activities would be best to pursue. Thus, we are canvassing the interests of other nations, as well as scientific and commercial interests, in what we might accomplish together in exploring the Moon. We must carefully choose those endeavors to which we eventually commit ourselves with our fellow spacefaring nations.

Much as we would wish otherwise, we cannot afford everything that many constituencies and interests would like us to do. There simply isn't enough money in the universe. In this context, it is clear that partnerships work best when all partners contribute resources toward a common goal that is greater than that which could be easily afforded by any single partner alone,

and, it is important to set realistic schedule milestones and to maintain clear interfaces.

I am extremely pleased with the steps taken thus far in formulating a lunar international exploration strategy. In April of this year, NASA hosted a workshop with over 200 participants, including individuals from 13 nations. Synthesizing this input, some common themes have since emerged when approaching lunar exploration. First, the Moon is worth studying in its own right, and just as we are learning to live and work in space onboard the ISS, we should try next to learn to live and work productively on another world altogether. In case of emergencies, a return to the Earth from the ISS only takes a few hours, a return from the Moon takes a few days, and a return from Mars takes several months. It is obvious that the Moon is the next logical step.

As President Bush pointed out when announcing the Vision for Space Exploration, “We will make steady progress – one mission, one voyage, one landing at a time.” This incremental approach will sustain our journey, and certain ideas for exploiting the Moon’s vantage point and resources will not be possible until we have established a significant presence on the Moon and incorporate it into our economic sphere. As my former boss, the President’s Science Advisor Jack Marburger, stated in a speech earlier this year, “Questions about the vision boil down to whether we want to incorporate the Solar System in our economic sphere, or not. Our national policy, declared by President Bush and endorsed by Congress last December in the NASA Authorization Act, affirmatively answers that question: The fundamental goal of this vision is to advance U.S. scientific, security, and economic interests through a robust space exploration program.”

NASA cannot carry out the exploration of the Moon and Mars on its own. We need the best ideas, and we need to leverage the capabilities of our international partners just as they want to leverage our capabilities. I believe the dialogue we’re establishing at this seminar and later workshops is helping to lay the groundwork for us to return to the Moon and extend our reach to the rest of the solar system together. During the next year, we will work with the international community to complete a framework for the global exploration strategy that will allow us to share individual agency architectures and determine a mechanism by which our exploration activities can continue to be coordinated.

Like the Hubble Space Telescope, the journey ahead of us hopefully will stand as a testament to perseverance and cooperation. We have many issues and challenges before us, so let us speak frankly to each other. Quoting from George Mason, “Happiness and Prosperity are now within our Reach; but to attain and preserve them must depend upon our own Wisdom and Virtue.”

Thank you.