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March 13, 2019

Statement of
Peggy A. Whitson, Ph.D.
before the

House Subcommittee on Space, Science, and Technology
"America in Space: Future Visions, Current Issues"

What is your vision for civil and commercial space over the next 10, 20, and 30 years?

The ultimate goal must be the establishment of an undeniable United States leadership in the exploration and privately-owned development of space. This will reap the direct benefits of technological advancements and economic growth while bolstering national security.

We are well past the flag-planting stage, and it's time we make our ventures into space both commonplace and sustainable. Twice I've had the honor of serving as commander of the International Space Station, living and working up there a total of 665 days. I can't stress enough the importance of the continued expansion of our space presence. It's no longer a matter of national pride. It's our national security, our future, and possibly our very survival.

I recommend a 10-year plan for a sustainable exploration into space that includes the following: 1) Continued technology development and testing on board the Space Station, prioritizing expertise beneficial for missions to the moon and Mars while establishing our presence there. 2) The creation of a deep space infrastructure such as the Lunar Gateway, an orbiting station close to the moon that would facilitate robotic and human surface operations. 3) Further robotic exploration of Mars to better define viable locations for human missions. And finally, the development of technologies to utilize local resources on Lunar and Mars surfaces.

Water for example. And minerals and other elements. We can't really be sure yet what we'll find. Which is all the more reason to go, and inherent in all this is the continued expansion of international and commercial partnerships.

The International Space Station in Low Earth Orbit is ideal for testing new and re-designed life support technologies that are lighter weight, smaller and more reliable. It's my belief that commercial-private sector expansion will open up new markets, and establish future platforms for research and technology, and the government-led Lunar Gateway would allow us to test and assess such things as solar electric propulsion, lunar robotic exploration, the early stages of human habitation on the moon's surface while taking advantage of the local resources. Again, mentioning water. Because with water, we can make fuel and oxygen.

Government-supported expansion to the moon would also serve to stoke the private sector's appetite for further commercialization. For example, providing cargo carriers and lunar landers to the Gateway, the moon and beyond. And developing and testing other capabilities such as excavation, drilling, atmosphere collection, in addition to manufacturing and construction.

In other words, like Robinson Crusoe we need to become reasonably self-sufficient up there for any plan to be successful and enduring.

Examples of Other Worldly Things to Look Forward To:

--Mars Oxygen In Situ Experiment is planned for the Mars 2020 mission to demonstrate the production of oxygen from the Mars atmosphere. Imagine that. Humans could breathe and have fuel without exorbitantly expensive cargo deliveries.

--Using indigenous resources to manufacture replacement parts, complex products, machines and integrated systems.

--Building with local materials produced on the moon and Mars to provide radiation shielding, landing pads, roads, habitats, whatever's needed.

The 20-year and 30-year plans would focus on Mars and include 1) Continued testing for deep space and surface technologies on board the Gateway and Lunar surface, 2)

Establishment of Martian infrastructure for continued robotic missions and human surface operations, and 3) Utilization of technologies that take advantage of resources on Mars.

Projecting ahead to 2040 or 2050, what would give you the most satisfaction in terms of where the space program is? Given your expertise in human exploration, please comment on how human exploration fit into your vision?

By 2040 or 2050, I envision surface colonization and research being conducted on Mars. In other words, I easily can imagine people living there, and one of many astounding benefits is that people on Earth will benefit from the technological developments required to go where no one has before. And do so in a way that unites humanity in goals bigger than ourselves as individuals, cultures or countries.

Space exploration reinforces our similarities, rather than our differences.

To what extent are the civil and commercial space sectors positioned (e.g., technology and research capabilities, workforce and skills, infrastructure, and plans and strategy) to bring your vision to fruition?

If the United States is to continue to lead the way in space exploration, it requires stable funding. Plain and simple.

How do the roles and responsibilities of government, the commercial sector, and international partners affect how the future of civil and commercial space evolves? How, if at all, are those roles changing?

To lead in space, we can't isolate ourselves. The US government-led exploration of the cosmos necessarily must include international collaborations. It's these partnerships that have enabled the International Space Station to be so successful. No matter the winds of politics, intra-governmental ties have sustained a 20-year and counting mission. Astronauts from around the world have lived and worked together successfully, blasting off in rockets, re-entering Earth's atmosphere in crew capsules, spacewalking, fixing things, and talking about our families and personal lives. Yes, more alike than different, and that gives me hope for humanity.

Also critical in our approach, we need to include even more avenues for the participation of our commercial sector, taking advantage of business savvy people and flexible and innovative approaches.

What are the challenges and issues regarding the future of space the Committee and Congress should focus on over the next two years?

The biggest challenge I see in future space exploration is ensuring stability and consistency. Coming up with a plan and sticking to it as we expand human presence deeper into space, while building the infrastructure to make it sustainable will lead to greater successes while maximizing tax payer dollars. Congressionally developed mechanisms to protect the long-range mission, with minimal setbacks between election cycles would be a huge step in assuring the continued US leadership in space.

Biography – Peggy A. Whitson, Ph.D.

Dr. Peggy Whitson is a former NASA astronaut and is currently a space and science consultant and adjunct assistant professor at Rice University. Over her career, she accrued a cumulative time of over 665 days in space, the most of any U.S. astronaut, most of any woman worldwide, and eighth most all-time. Since her first space flight in 2002, Dr. Whitson has completed three separate long-duration missions to the International Space Station, serving as commander twice. She also has conducted 10 Extra-Vehicular Activities, or "space walks," totaling over 60 hours, the third most worldwide.

While at the ISS, Dr. Whitson conducted over 320 scientific experiments, ranging from combustion physics to cancer treatment. She also made significant improvements to operating procedures to allow for more efficient scientific and maintenance activities in the future. Her experiences with NASA also took her underwater as an Aquanaut, when she performed numerous studies as the commander of the 5th NASA Extreme Environment Mission Operations mission.

Dr. Whitson received her Bachelor of Science in Biology and Chemistry from Iowa Wesleyan College in 1981 and a Doctorate in Biochemistry from Rice University in 1986. Soon after at NASA, she continued her biochemical research at the Johnson Space Center. By 1992, Dr. Whitson was named the Project Scientist of the Shuttle-Mir Program, where she integrated US and Russian teams to successfully perform joint research on board the Russian MIR and US Shuttle missions, the start of her extensive record of international coordination. In this time, she also served as Deputy Division Chief of NASA's Medical Science Division, controlling and distributing their $35M budget to advance cardiovascular, neurovestibular, immunological, and biochemical research.

Following her project scientist role, Dr. Whitson was named Co-Chair of the US-Russian Missions Science Working Group in 1995. There, she negotiated with her Russian counterparts on the details of science hardware shipments and on-orbit crew operations until beginning basic astronaut training in 1996.

After two years of leading the Crew Support Office in Russia, where she supervised integration between Russian and U.S. systems, Dr. Whitson trained to be the backup flight engineer for Expedition 3 to the ISS. Then, as part of Expedition 5, launching in June 2002, she was First NASA Science Officer of the ISS for the six-month mission. During this time Dr. Whitson installed multiple truss elements, shields, and other systems to the International Space Station while conducting 21 biochemistry experiments.

From 2003-2005, Dr. Whitson served as Deputy Chief of NASA's Astronaut Office. This role included personnel, facility, and budget planning as well as developing crew training and rotation plans, especially for long-duration missions. This culminated in the forming of a new position, ISS Operations Branch Chief, which she served as in 2005, better supporting international ISS crews in training and in orbit.

For ISS Expedition 16, a six-month mission beginning October, 2010, Dr. Whitson became the first ever female Commander on the International Space Station. This role required extensive international training, planning, and coordination. Dr. Whitson's team assembled a new stage of the ISS, resulting in more than 40% increase in internal volume. All planned objectives of the mission were met, as well as 3.5 times more scientific experiments than were originally planned.

Upon returning in 2008, Dr. Whitson was selected as Chairperson of the Astronaut Selection Board, revamping the selection process in choosing the astronaut class of 2009. Dr. Whitson then became the first female and non-military leader to ever serve as NASA's Chief of the Astronaut Office. In this role, she assessed objectives and crews to ensure the success of ISS and Space Shuttle missions. She oversaw astronaut selection, training, and mission support and served as the U.S. representative for the Multilateral Crew Operations Panel, eventually serving as chair of the international board.

Dr. Whitson continued to select and train astronauts from 2012-2016 until she was selected to join ISS Expedition 50-51-52, launching in November 2016. In these missions she served as Flight Engineer and once more as Commander over the 9.5-month mission. In this time Dr. Whitson performed 40% more scientific investigations than what was originally planned and conducted six more spacewalks, conducting maintenance and upgrades to the station.

Over her career, Dr. Whitson has amassed a number of awards and honors, too many to list in full, but they include…

- 2019 Women in Space Science Award
- TIME Magazine's 2018 Most Influential People in the World
- NASA Outstanding Leadership Medal, 2013
- Aviation Hall of Fame of Texas, San Diego, and Iowa