Written Statement of

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Chairwoman Johnson, Ranking Member Lucas, and Members of the Committee, thank you for the opportunity to discuss the future of space science and exploration here today.

As a planetary scientist, former Chief Scientist of NASA, and the current John and Adrienne Mars Director of the Smithsonian's National Air and Space Museum, there is no topic I find as exciting, or as fundamental to scientific discovery, technological development, and economic growth, as this one.

The study of space begins and ends here on Earth. From ground-based observatories to interplanetary probes and human spaceflight, the improvement of life on Earth has been the impetus for, and guiding principle behind, all space exploration. Why do we explore? What do we hope to gain? What waits for us on the Moon, on Mars, and beyond? The answer was, is, and always will be found here at home.

In the nineteen sixties and seventies, the world experienced such a surge in space achievement that one astronaut commented that it was as if a decade of the twenty-first century had fallen backwards into the twentieth. Our world today is largely defined by the social and technological legacy of that era. Now, fifty years after we first set foot on the Moon, we are entering a new space age, and it is poised to be even more transformational than the first.

The commercial, scientific, and security development of the space around Earth has been a priority of space agencies and commercial partners for decades. With the completion of the International Space Station, and countless constellations of satellites, our efforts in Low Earth Orbit are reaching maturity, and in the next ten years, we will become ever more dependent on our orbital infrastructure to support our way of life here on the ground.

Consider the stunning social, economic, and security implications of the GPS system, now entering its third decade as a public asset. Now apply that scale of transformational change to critical sectors like energy and agriculture. Just this past week, reports on the impacts of salt-water intrusion on coastal farmland, and the devastating effects it has on farmers and their families, illustrated the imminent danger of climate change.

As sea levels rise and weather events become more extreme, agricultural activities will require sophisticated data from Earth-observing satellites. And that is just one of many sectors that will require space-based intelligence to make essential decisions to keep our economy moving forward as we work to mitigate the effects of climate change.

Understanding climate change on Earth is also informed by our studies of planets across the solar system. Comparative studies of planets—from greenhouse gasses on Venus to interior quakes on

Mars, or volcanoes on the icy moons of the outer solar system—moves our understanding of Earth's complex environments forward.

But in the next twenty years, our study of worlds beyond our own will yield a new discovery that will tell us tell us even more about our home in the universe. We will discover life elsewhere in space. It will likely begin with fossil evidence of life on Mars, then simple organisms under the ice on Europa and Enceladus. The hydrocarbon seas on Titan could provide proof of life so alien that it redefines our understanding of how it evolved here on Earth, and the possibilities for life in exotic environments beyond our solar system.

The discovery of extraterrestrial life will be a defining moment in the twenty first century, just as the Moon landing was in the twentieth. But to get there, we must invest in deep space missions like the Europa Clipper, Mars 2020, Mars Sample Return, and in human exploration beyond Low Earth Orbit. We know where to look, and we know how to look. We have the technology to determine if life has evolved elsewhere in the solar system, and can easily do so within the next two decades.

At the same time, our powerful telescopes, on the ground and in orbit like the James Webb Space Telescope, will be zeroing in on Earth 2.0. We will never find another place exactly like home, but finding another world in the cosmos with the same kind of biosphere will be a defining moment in our history.

In the next thirty years, I hope that humans will have achieved a flourishing presence in the solar system, including a permanent presence on the Moon, and a scientific outpost on Mars. Thanks to NASA's ongoing voyages to Mars from the Mariners' observations to the Viking landers to our incredibly successful rovers, we now know more about Mars than any other planet in the solar system save Earth, and learn more almost daily.

When we first launched Viking in the 1970s, Mars appeared within our grasp. Today, it remains the "horizon goal" according to the National Academy of Sciences, but I believe we can see the path to that horizon more clearly than ever, and we have been preparing steadily for the journey.

The exciting developments in commercial space operations in Low Earth Orbit are a key foundation to our launch platform for Mars. Having a robust private sector in LEO and eventually the Moon, will let us free government agencies to focus on our next giant leap to Mars.

So, the question before us is are we on the right path to realize this bright future? I'd say the answer is a tentative yes, with opportunities and challenges. Getting there depends on consistent investment focused where it brings the biggest and most significant return.

That includes finding the right balance with the private sector, so NASA can do what it does best, big picture exploration and cutting-edge science, and of course aeronautics. But, it also means investing in fundamental building blocks, beginning with a diverse, enabled workforce to bring all the creativity and talent of our nation to the task- this is what we focus on at the National Air and Space Museum. It includes infrastructure, both in physical technology, and in academy-level science in astrophysics, heliophysics, Earth science and planetary science. That research both guides us where and how to look for answers to the questions we have today, and generates the questions we've never considered that will drive our ongoing exploration.

As we celebrate the 50th anniversary of Apollo, at the Museum we have been spending time thinking about what it took to meet such an audacious challenge as landing humans on the surface of another world just 8 ½ years after a young president set the goal. It took then what it will take now to land humans on Mars and to truly exploit the potential of space- a national commitment, steady and reliable funding, and an understanding that with giant leaps comes risk. But that risk is what leads to great rewards- with investments in technologies that can transform our economy and keep us at the forefront of the world.

The challenges and opportunities of this moment, like those fifty years ago when we first landed on the moon, can lead to amazing, enduring achievements for the benefit of all humankind. I look forward your questions.