Written Testimony of

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Thank you, Mr. Chairman, for giving me the opportunity today to express my personal views concerning The Administration's "game-changing" proposal for the future of America's role in Human Exploration in Space.

Some weeks ago when we became aware of The Administration's plan for our nation's role in the future of space exploration, Neil Armstrong, Jim Lovell and I felt compelled to voice our concern and did so in an opinion paper signed by the three of us. We spent a great deal of time writing and refining our document, choosing our words very carefully, words such as "devastating", "slide to mediocrity", and "third rate stature", so that the intent of our message would neither be misinterpreted nor would our deep concern about the future direction of human space flight as outlined in the President's proposal be misunderstood. We particularly wanted to avoid any political overtones because the support of America's role in space since its beginning has traditionally transcended partisan politics.

It was determined after the Columbia accident that NASA should return to its core values, focusing its resources once again on space exploration while continuing its space exploitation through the Space Shuttle support of the International Space Station (ISS) and other national priorities of Low Earth Orbit (LEO). The Congress supported such a focus with a near-unanimous bi-partisan approval in both the 2005 and 2008 NASA Authorization Acts.

We have recently heard a lot of eloquent verbage about the exploration of space – landing on an asteroid, circling Mars, and at some time in the future perhaps landing on the Red Planet. There is talk about a decision yet to come of building a large booster which might ultimately take us almost anywhere we want to go into the far reaches of the universe. There are, however, no details, no specific challenge, and no commitment as to where or specifically when this exploration might come to pass. My personal definition of space exploration, in contrast to exploitation, is "going where no man has gone before, doing what has never been done before, doing what others couldn't do, wouldn't do, or perhaps were afraid to do."

And, when one examines details of the FY2011 budget proposal, nowhere is there to be found one penny allocated to support space exploration. Yes, there has been much rhetoric on transformative technology, heavy lift propulsion research, robotic precursor missions, significant investment in commercial crew and cargo capabilities, pursuit of cross-cutting space technology capabilities, climate change research, aeronautics R&D, and education initiatives, all worthwhile endeavors in their own right. Yet nowhere do we find any mention of the Human Exploration of Space and nowhere do we find a commitment in dollars to support this all important national endeavor. We (Armstrong, Lovell and I) have come to the unanimous conclusion that this budget proposal presents no challenges, has no focus, and in fact is a blueprint for a mission to "nowhere."

In this proposed budget we find several billions of dollars allotted to developing commercial human access to low Earth orbit, based upon the assumptions and claims by those competing for this exclusive contract who say that they can achieve this goal in little more than three years, and that it can be done for something less than 5 billion dollars. Even The Administration has shown some concern over these claims by admitting a willingness to subsidize the commercial enterprise until it ultimately becomes successful, calculated by some to be as long as a decade or more with costs rising by a factor of three. (These are the same entrepreneurs who are well over a year late delivering the first unmanned cargo to LEO.) This assumes they have the capability in hand to design, build, flight test, and develop a man-rated spacecraft and booster architecture meeting the stringent requirements for safety along with the infrastructure required for such a venture. Infrastructure such as redesigning the requirements of mission control, developing and supporting training simulators, writing technical manuals for ground and crew training including all onboard procedures, developing the synergy between a worldwide tracking network and the uniqueness of a newly designed space vehicle along with an emergency recovery force standing by to handle this new space architecture. These are only a few of the development and support requirements necessary to put any new manned system into space. Although I strongly support the goals and ideals of commercial access to space, the folks who propose such a limited architecture "do not yet know what they don't know", and that can lead to dangerous and costly consequences. There are a myriad of technical challenges in their future yet to be overcome, perhaps of greatest importance are safety considerations which cannot be, nor will be, compromised as well as a business plan and investors that will have to be satisfied. For example, it took over a year and a half of review and redesign of the Apollo I hatch prior to ever getting Apollo 7 off the ground, before operational and safety requirements were fully satisfied.

Based upon my background and experience, I submit to this Committee and do support the view that it will take the private sector as long as ten years to access LEO safely and cost-effectively. A prominent Russian academician is quoted as saying in order to bring a craft to the standard of quality and safety for piloted flight, the United States will be dependent on Russia until at least 2020. The Aerospace Corporation, although directed not to examine the data submitted on cost and schedule by the commercial sector, estimates an initial cost of 10-12 billion dollars, plus the added cost of modifications required to launch vehicle ground systems. Should such a commercial venture run into

insurmountable technical problems, business venture concerns, or – God forbid – a catastrophic failure, it would leave the United States without a fallback program, unable to access even low Earth orbit for some indeterminate time in the future. Without an extension of the Shuttle on the front end and viable access to LEO on the far end, "the gap", or the period of time when America is grounded, could very well be extended indefinitely.

The sole reliance on the commercial sector without a concurrent or back-up approach could very well lead to the abandonment of our 100 billion dollar, 25 year investment in the ISS, default on our commitments to international partners, and will ultimately cost the American taxpayer billions of unallocated dollars and surely lengthen "the gap" from Shuttle retirement until the day we can once again access low Earth orbit leaving our nation hostage to foreign powers. Moreover, for a variety of reasons, a "Going Out of Business" sign hanging on the door is always a possibility in any high dollar - high risk investment. Is this one of our "Potential Grand Challenges" of the 21st century?

The United States, through NASA, has spent a half-century learning what we didn't know, finding answers to questions we weren't smart enough to ask at the time, developing technology that was needed to meet the challenge and get the job done. We came from Alan Shepard's flight in 1961 to the Shuttle and Space Station today with a side trip or two to the moon along the way. The evolution of this learning process was not without its cost – not just in dollars, but also in the lives of our friends and colleagues. It took the courage, effort, dedication and self-sacrifice of thousands of Americans who allowed us to come this far this quickly. And, although we paid dearly for our mistakes, it is a testimonial to their commitment and American ingenuity that everyone who went to the moon came home. Therein is a lesson we cannot afford to ignore. Is this the NASA we want to transform?

Additionally, The President's proposal suggests we develop "game-changing" technology for the future. The technology we enjoy today, 40 years after Apollo, is technology that evolved from a purpose, from the acceptance of a challenge and from a commitment to a goal. It was technology with a focus, with a mission. To simply put the best and the brightest in a room and tell them to develop breakthrough technology that could or might or may be useful in the future is a naïve proposition. Exploration drives technology innovation – not the reverse.

Also in the proposal is the possibility that maybe, at some time, perhaps as far down the road as 2015, the United States might decide to develop a heavy lift booster. This is a very vague proposition, one that will likely never be funded to fruition. Coincidently, Constellation has a heavy lift booster, Ares V, not only on the drawing boards but in component test today. Do we need a decision in 2015 for one already made today?

A late addition to the Administration's proposal, and one very obviously not well thought out, was a provision to build an "Orion Lite" spacecraft as a rescue vehicle on the ISS. Although we have never had need for a rescue vehicle, we have today under contract

with Russia two Soyuz continuously stationed on the ISS capable of carrying as many as six people to safety should the need arise, with a provision for a third Soyuz were the crew complement ever to increase to as many as nine – which is highly unlikely. An "Orion Lite", before it is qualified to transport human beings to safety from the ISS, certainly would have to be man-rated. To man-rate a spacecraft and its ride into orbit requires a great deal more than following a list of safety requirements and protocol instructions included in its development. The "Orion Lite" would have to go through an extensive development, test and evaluation phase before being qualified to carry humans. It sounds very similar to what the existing Ares I/Orion development proposal is all about and would most likely cost as much, and require the same amount of time to bring it to man-rated flight status, yet leave us with half the capability of a full up Orion.

Constellation itself is an architecture that over a five-year period has gone through several detailed reviews and has been vetted by every government agency from the OMB to the DOD, and certainly by NASA – by every agency that has an ownership interest in any technical, scientific, budget or benefit to be derived from Human Space Exploration. In addition, an arsenal of the best engineers, scientists and management experts in America's aerospace community added their knowledge and expertise to the review of the proposed Constellation architecture before it ever became an official program worthy of consideration. Constellation follows the Von Braun model in the evolution of the Saturn V, wherein the development of the Ares I is the embryo for the development of the heavy-lift Ares V. This shared DNA, with commonality of critical components throughout, leads to greater cost effectiveness, a higher degree of confidence and safety, and provides the first elements of a heavy lift booster. It is not unlike the Boeing family of jetliners wherein the technology built into the 787 evolved from that of the original 707.

Embedded in the Constellation architecture is the culture of a long-range building block that cannot only service the ISS, extend the life of the Hubble, meet other national priorities in LEO, but additionally can carry us back to the moon and on to Mars. In doing so, it makes use of existing hardware and facilities while developing new technologies with a purpose. Appropriately under the law, both Houses of the Congress of the United States with overwhelmingly bi-partisan support, approved and agreed that Constellation should go forward.

In contrast to the five-year review of the overall Constellation architecture plus the carefully monitored program development, the Augustine Committee was required to provide their report in 90 days. The report contained several suggestions and alternatives to Constellation, few of which were included in the FY2011 budget, but ultimately the Committee came to the conclusion that Constellation's architecture had been well managed and is indeed executable, providing it has the appropriate funding that had been denied for several years. Important to note is that the Committee was directed to base their conclusions and recommendations not on the FY2009 budget, but rather on the FY2010 budget from which tens of billions of dollars had already been removed between 2010 and 2020. Additionally, their conclusions were based upon a 2015, not 2020, life

span for the ISS and did not take into account ongoing requirements for access to LEO at other inclinations. Naturally, the Augustine Committee concluded that Constellation was not doable within the constraints of The Administration's mandated guidelines and budget restrictions. Under these constraints, one might have expected the conclusions to be predetermined. More importantly, however, the funding proposed for FY2011, if prudently administered, is more than adequate to continue the development of Constellation.

It is unknown how much time and thought was put into the existing budget proposal for FY2011, or by whom this proposal was generated, but it is common knowledge that few if any of those government agencies referred to above were asked to participate, nor, of significant note, was the DOD or the engineering or management expertise that exists throughout NASA today. With no transparency, one can only conclude that this proposal was most likely formulated in haste by a very few within the Offices of Management and Budget (OMB) and Science and Technology Policy (OSTP), with the alleged involvement of the NASA Deputy Administrator, and by his own admission, with little or no input from the NASA Administrator himself. Neither did NASA's Center Directors, nor senior NASA management throughout the agency, nor program managers have any input. If that is indeed the case, the originators quite likely were promoting their own agenda rather than that of NASA and America's commitment to Human Space Exploration as directed by Congress in the Authorization Bills of 2005 and 2008.

With the submission of FY2011 budget, The Administration and the originators of this proposal were either misinformed or showing extreme naivete, or I can only conclude, are willing to take accountability for a calculated plan to dismantle America's leadership in the world of Human Space Exploration resulting in NASA becoming nothing more than a research facility. In either case, I believe this proposal is a travesty which flows against the grain of over 200 years of our history and, today, against the will of the majority of Americans.

The space program has never been an entitlement, it's an investment in the future – an investment in technology, jobs, international respect and geo-political leadership, and perhaps most importantly in the inspiration and education of our youth. Those best and brightest minds at NASA and throughout the multitudes of private contractors, large and small, did not join the team to design windmills or redesign gas pedals, but to live their dreams of once again taking us where no man has gone before. If this budget proposal becomes the law of the land, these technicians, engineers, scientists, a generation removed from Apollo, yet re-inspired by the prospect of going back to the moon and on to Mars, will be gone – where I don't know – but gone.

America's human space flight program has for a half century risen above partisan differences from Eisenhower to Kennedy to the present day. The challenges and accomplishments of the past were those of a nation – never of a political party or of any individual agenda. Those flags that fly on the moon today are neither blue flags nor are they red flags – they are American Flags. We are at a cross road. If we

abdicate our leadership in space today, not only is human spaceflight and space exploration at risk, but I believe the future of this country and thus the future of our children and grandchildren as well. Now is the time for wiser heads in the Congress of the United States to prevail. Now is the time to overrule this Administration's pledge to mediocrity. Now is the time to be bold, innovative and wise in how we invest in the future of America. Now is the time to re-establish our nation's commitment to excellence.

Thank you Mr. Chairman and members of the Committee for this opportunity to share my concern and passion for that which means most – ***the future of our country!***

Sincerely, and with respect,

Eugene A. Cernan
Commander, Apollo XVII