

“A Third Generation American Space Program”

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What the Obama Administration Can Do.

The Role of a New National Space Council

During the Presidential campaign the Barack Obama indicated that under his administration he would recreate a National Space Council, an instrument that had been used by previously Democratic Presidents.

What goals should be identified and what policies pursued by the new National Space Council? Every administration must pursue a set of balanced policies suited to both the times, financial resources, and organizational structure of the government. US Space policy involves relationships with foreign governments, as well as the “family” of space agencies within the US government, and a partnership with resources of the private sector.

The financial problems facing the US and the global economy also present the requirement to better manage national and international resources. These are opportunities for the US to demonstrate both national and international leadership.

A. An Expanded NASA Partnership at Home

1. Spreading the economic benefits to all states:

NASA's support base has been perceived as skewed because of the employment impact of its Centers and contractors on a few states: Alabama, California, Florida, Maryland, Mississippi, Ohio, Texas, and Virginia.

- NASA must place a national emphasis on engagement, recruitment, training and employment of a new generation of American space scientists and engineers.
- The NASA Space Grant network of 550 American Universities spread across the 50 states and territories should be a more vigorous focus for scholarships, research, and engineering development.
- New business development should also be stimulated through more SBIR programs in all 50 states.
- Students should be encouraged to develop the high tech sector across the country and produce a commercial “spin-up*” enterprises as part of their career training and planning. (*looking for possible profitable terrestrial applications of a needed technology and creating incentives for entrepreneurs to pre-develop the technology in question for those terrestrial applications, thus putting a near analog of the needed technology “on the shelf” at no cost to NASA or taxpayers, consumers paying the costs instead.)

These efforts will provide a better national distribution of education, research, and business development resources and recruitment of a new generation to pursue the country's space goals.

2. Partnering with NOAA

NASA has had the problem of having to pursue many goals both with inadequate funding. One policy change should include the policy of moving NASA's Earth observation programs to NOAA. NOAA should have unified responsibility for observing and protecting the Earth's environment including collaboration with other nations in a "system of systems" program.

3. Partnering with DOE

NASA shut down its office on space solar power. Yet this initiative offers the solution to both the threat to the Earth's environment from depending on fossil fuels and also of creating the largest growth engine of the global economy. The Department of Energy should be given overall responsibility for space energy initiatives in a division devoted to these goals. DOE's space energy division should develop space based energy supplies including those aspects which involve space solar power, space fission reactors, RTG's for deep space missions, and the development of fusion power technologies applicable to (such as the ITER program). and the potential of Helium 3 fuels, and space propulsion technologies.. Glenn Research Center's activities might be transferred to the new space energy division of the DOE. These research goals should also be undertaken with in the context of international partnerships. The proposed demonstration prototype space solar power program suggested by the National Space Security Office of the Department of Defense should be the responsibility of the DOE.

4. Partnering with DOT

The Department of Transportation should pursue the development of commercial space transportation services working with the new state spaceports as well as Federal launch facilities to create a vigorous competitive space transportation industry which is well positioned to provide contracted services to both the US government and its various space agencies as well as private commercial space activities. It should take charge of a variety of space transportation initiatives including the COTS programs serving the ISS, the "responsive space launch initiatives needed by military space agencies for small satellites, the development of high flight rate low cost reusable heavy lift systems, and the development of space transportation infrastructure including refueling capabilities and "space port" facilities with international partners in LEO, GEO, L1, LLO, and the lunar surface. This will enable a variety of initiatives.

5. NASA has been accused of "Eating its children"

NASA has focused financial resources on the Constellation Program. NASA critics have especially focused on reductions in Earth observation activities and in the Science Mission Directorate. The shift of Earth Observation responsibilities to NOAA would better address this need.

The SMD [Science Mission Directorate] should also look to share the costs of proposed missions with international partners across the full spectrum of proposed missions. Its record of breath taking missions and discoveries should be increased with the participation of many other nations.

6. NASA's Constellation Program should face review in several regards.

The ARES I and ARES V rockets are projected to use "new" solid rocket boosters that perpetuate the use of heavily polluting fuels. These should be scrapped and replaced by newly designed

LOX/Hydrogen fueled boosters that are consistent with protecting the atmosphere and whose use can be defended in a high flight rate mode. This system also continues to saddle the US with a low flight frequency high cost structures expendable architecture.

Even the “Gold Cadillac” Shuttle program which failed to meet its promised cost, flight rate, or flight safety goals and was an attempt at a reusable infrastructure. The Shuttle has been characterized as too expensive at \$ 500 million per launch and too infrequent at a rate of 6 launches per year. The Constellation lunar program would launch three times per year and cost \$ 2 Billion per mission. The heavy lift Falcon 9 vehicle is projected to cost \$ 78 million dollars per launch as an expendable system by contrast with the Ares vehicles.

Rather than retreat with few lessons learned from the existing STS architecture we should demand an architecture that does deliver a high flight rate, lower cost, greater safety and essential reusability.

NASA was charged with a VSE of creating a new system based on shuttle heritage technology but has managed once again to ignore this direction, over-price, and under-perform this task creating a gap in US access to space. Pouring yet more money into what would create another monopolistic, limited flight rate and overly expensive system also stunts the promising development of new commercial providers. While the COTS initiative must be applauded as it amounts to not even 1 shuttle launch equivalent of NASA's funds. A real commitment to commercial space development should further accelerate commercial providers which can deliver high flight rate, lower cost systems, and safe man rated reusable transportation systems. Funds should rather be used to support new initiatives and new employment for the next generation of American engineers and space scientists rather than propping up the old systems and a highly flawed Constellation program.

Some aspects of the Constellation program already funded may be salvageable such as the work on the CEV and the Altair. Plans for an Altair ascent vehicle which preclude refueling with lunar in situ produced fuels demonstrate a short sighted vision which builds in dead end design and makes future evolution more difficult. A reusable Altair should be capable of many trips between LLO and the surface. It should also be designed to make sorties to the entire lunar globe a key design objective.

B. An Expanded Partnership Abroad

1. An International Moon Program

The US should make an international Moon Program a key space priority. Its messages to other nations should be “Let's Go to the Moon Together.”

The US is the preeminent space power in the world. NASA's budget alone is more than the combined total of the rest of the world's civilian space program. Yet other nations of the world are expanding the resources devoted to space programs, accelerating their efforts, and emerging as competitors. The Bush administration's VSE and its renewed emphasis on a human return to the Moon has been met by a response by the declarations of China, Russia, and Japan that they too will place humans on the Moon. The European Space Agency is also moving in this directions with plans for a lunar cargo lander and a European capacity to send humans into orbit. The Indian Space Research Organization has signed a 10 year agreement with Russian on lunar mission development and cooperation. It also is committed to an independent manned orbital capacity and new heavy lift launchers.

2. Replacing Unilateralism

The perception of the unilateralism of the Bush administration can be countered with a constructive initiative on the part of the US to share the costs, risks, and benefits of space development with other nations. An international lunar program should also be balanced with other cooperative international efforts.

C. Lets Build on a Heritage of Peaceful International Cooperation:

- Apollo: We Come in Peace for All Mankind
- Apollo -Soyuz
- International Space Station
- International Space Exploration Agreement
- International Lunar Network Agreement
- OSEWG and a variety of International Working Groups such as ILEWG, MWG

1. Moon, then Mars

To the extent that international cooperation will permit, a “Moon, then Mars” program commitment should be sought with common shared standards of architecture such as refueling capacity and supporting systems, common docking and rescue, and communication and tele-robotic operations standard, and provision for use of in situ resources. Where competition and duplicative efforts prevail even these can be hopefully be used in a collaborative manner toward the commonly held goals of lunar exploration, human settlement, and commercial development and to create fail-safe capacities.

2. A cooperative, international effort

A human return to the Moon should be a cooperative effort to develop an international lunar base as well as a global exploration program serving the goals of both scientific and commercial development of Earth's “Eighth Continent.”

The future objective of human exploration of Mars should be advanced by what is learned from the push to the Moon and by continued international robotic preparation for this great advance.

3. Making ISS truly International

The US should continue its commitment to the ISS but expand this partnership to include both the Chinese National Space Agency and the Indian Space research Organization and other nations as they develop space faring capabilities.

4. A New Space Treaty

The US should work to create an international treaty of space faring nations that guarantees access to space to all nations that pursue a peaceful use of space but a denial of access to nations that attempt to militarize space. This extends the tradition of “the freedom of the seas” and addresses the national security needs of all peaceful space faring nations. It would also address issues such as “international technical means” to re mediate space debris and the attempt of any nation to deny space access and space operational capabilities by generating space debris. A system of sanctions to reinforce such

guarantees should also be developed to prevent and deter space terror tactics.

This space access issue was high lighted by the former President of India Dr. Abdul Kalam during his term of office and is of strategic importance for all of the current space faring powers.

This objective can prevent a militarization of space and a clear message to nations developing both missile and nuclear technology that a peaceful global norm for space operations has been established. Both the national security of the United States and the creation and enforcement of recognized international norms are appropriate roles for the US space agencies and organizations involved in national security.

5. Taking Development of Geosynchronous Orbit to the next level

An international project to develop a prototype a next generation GEO platform should be initiated. The finite and limited number of GEO orbital slots demands that a more capable platforms be created to meet the inevitable demands of the 21s century for communications and precision Earth observation services. This initiative should involve both the government space agencies as well as commercial partnerships. The global demand will means that many such platforms will be needed in what can emerge as a major expansion of commercial space activities.

6. Developing Clean Space Power Technologies

An international initiative to develop prototype clean space solar power technologies should be begun. A path to developing a clean global solar power supply must offer both hope and an opportunity for participation by not only the developed and space faring nations but include the energy needs of the emerging economies. A SBSP road map might include several steps.

First, the ISS could be a starting testbed for some aspects of this project. Other aspects of this project might be part of a GEO platform project as a significant second step. Yet other aspects of this might include a third stage free flying independent platform. and the test of designated ground based rectennas as reserved test beds area in a variety of partner countries.

7. International Space Transportation Infrastructure

An international space transportation infrastructure should be developed so that the above initiatives are both technically and financial viable. Investments must be made in high flight rate and low cost launcher systems and refueling capabilities. This last goal will do more than anything else to encourage private investments in new commercial activities ranging from private research facilities, space tourism, space manufacturing. Traditional commercial space activities in the profitable broadcast, broadband, navigation and positioning, telecommunications, and Earth observations markets can also expect strong growth.

8. NOAA's "Mission for Planet Earth"

NOAA should pursue is Mission for planet Earth with its system of systems partnership with other nations so that the capacity to understand and monitors, and protect the Earth's unique environment is enhanced.

9. Encouraging Commercial Activities in Space

Commercial activities in space should be encouraged and supported with efforts to expand communications, begin space manufacturing, construct large structures, supporting research and development activities, supply “space port services”, and enable privately funded human space flight.

10. Delivery of Main Stage Fuel Tanks to LEO and in-orbit Refueling

Delivery of main tanks to LEO and the creation of a refueling infrastructure in orbit must be mandated for the US launchers and hopefully coordinated with other nations so that a robust commercially open, and international transportation infrastructure is created on the way to GEO, the Moon, Mars, and the rest of the solar system and are willing to assume the responsibilities of full partnership

Conclusion

- The current global economic contraction may require cooperative programs of economic stimulus and cooperative space policy is an area where mutual benefits can be established.
- The potential for both payback and economic growth from the US space program are areas where the Obama administration can deliver important national and international leadership.
- While the domestic recommendations shift many responsibilities to other departments, this set of recommendations recognizes and reinforces that NASA's primary mission is in pioneering technology, and the scientific exploration of the solar system.
- NASA is one of many agencies of the US government that uses space transportation assets but its special mission should be to test the untried and seek the unknown.
- Low earth orbit operations, space based communications, transportation, construction, and commercial operations should be the province of other Departments that have 21st Century technology and responsibilities.
- The Department of Energy must advance the promise of global clean energy supplies from space that provide the only answer to both the Earth's demand for additional energy and growth as well as the means to conserve and heal the damaged environment.
- Our leadership in space should be a special strength of our foreign policy and a way of building both bridges and peaceful economic relationships with the community of nations as an Earth-Moon economy is created and as the human exploration of Mars is advanced.

This paper is submitted to the Transition Team on Space as a Draft Position Paper of The Moon Society – www.moonsociety.org - a proactive space advocacy membership society.