

Addressing the Challenge of Sustainability in the Exploration Enterprise:
Issues of Public Perception and Political Will

Response to NASA Exploration Systems Enterprise Request for Information

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Introduction

The National Vision for Space Exploration proposed by President Bush in January 2004 calls for humans to return to the Moon, establish a presence there, and use the capabilities developed on the lunar surface as a stepping-off point for further exploration of the Solar System, with Mars as the initial destination. Specific milestones include the launch of robotic missions to the lunar surface by 2008, human arrival on the Moon between 2015 and 2020, and the execution of a human Mars mission sometime thereafter. As noted in NASA's roadmap for the Vision published in February 2004, a number of technical and programmatic challenges are inherent in such a far-flung enterprise. None is more critical in both the short and long-term than the question of sustainability. Succinctly put, how can a program of the Vision's size and scope be promoted, funded, developed, matured and maintained over a time span of 30 to 40 years at minimum? One view of the problem is that the roadmap for Exploration may be reduced to two top-level requirements vis-à-vis sustainability:

- 1) Ensure a sufficient level of political will and the associated appropriate levels of funding to sustain the program across 30-40 years
- 2) Ensure sufficient programmatic and technical viability within NASA and its national/international partners, both governmental and industrial across the lifespan of the program

Requirement #2 must be addressed by a combination of program structure and management based upon System-of-Systems (SoS) integration models, diplomatic and technical agreements on the international front, a robust cost sharing model, and careful attention to the development, recruitment, and maintenance of a sufficient workforce with the necessary skill sets. However, it is to the former set of challenges that this paper is addressed. The scope of the problem will be limited to the United States' democratic system, in which the political process yields the opportunity for significant shifts in the constituencies, ideological bases, funding philosophies, and individuals serving in political office over the 30-40 year period envisioned for the Exploration Enterprise.

The Challenge of Sustainability

A behaviorally-based restatement of Requirement #1 might be: "Ensure a sufficient number of politicians at the national level to be actively involved in appropriating and successfully maintaining funding for the Exploration Enterprise across its duration." Put in this way, the goal may be seen as a marketing problem of significant complexity. In response, the ideas put forth in this white paper, although influenced by commercial marketing experience, are also informed by strategic planning methods, public policy and media studies, educational/curriculum design, social psychology, political outreach practices, and recent studies of commercial space programs (Dittmar, 2003). Some obstacles associated with the achievement of this goal will be described below. Each description will be followed by strategies intended to address the obstacle, accompanied by a paragraph or two with ideas for implementing it. Finally, some proactive approaches targeted at specific constituencies are offered for consideration.

A recurring theme throughout the paper is the suggestion that NASA acquire outside expertise in the development of a national public relations campaign aimed at implementation of some of the strategies described here (and others), and also at proactively developing broad public support for the Enterprise. Restrictions on NASA's ability to "advertise" have been historically misinterpreted and do not extend to public outreach and education as pertain to either NASA programs or performance. Such a campaign might also be leveraged with more traditional, commercial marketing efforts undertaken by NASA's industrial partners in the Aerospace sector, who also have broad political lobbying discretion that is not available to NASA.

It should be stressed that no single approach will be successful at achieving sustained political interest and funding levels. What is needed is a well-planned approach that is flexible enough over time to respond to changes in the political environment. Telling the story once will not be enough; it will have to be told over and over again across the decades, building upon anticipated successes of which NASA is demonstrably capable, while also demonstrating the organizational competency and accountability necessary to address the inevitable failures that will surely come.

Challenges, Answering Strategies, and Ideas for Implementation

Challenge 1: The public and political sectors will have to wait years after committing money before any visible benefits accrue at various points in the program. Left unattended, this "lapse" may negatively impact public interest, dampen political enthusiasm, and jeopardize funding (per International Space Station Program).

Strategy 1: Demonstrate early and highly visible mission success. Accelerate the robotic mission schedule; get rovers on the Moon as quickly as possible. Provide "hands-on" opportunities for the public during planning, development and mission execution via the Internet.

Implementation 1: The current roadmap calls for the first robotic mission to be launched in 2008. There are, however, other mission models that might enable faster implementation (see for example, Morin, Lee, et. al, "Rocks to Robots", submitted as a response to this RFI under "Architecture Elements"). The intense public interest in Mars rovers, demonstrated first by Pathfinder and again recently by the Spirit and Opportunity missions provides a clear "proof of concept" for valuable, successful mission opportunities that will engage the public. Leveraging this interest in creative ways may create interest in the broader program, particularly if specific linkages between daily Moon rover activities as the "building blocks" for human activities are presented early and often throughout the robotic missions via animations, "specials", documentaries, etc. In addition, encouraging vicarious participation via carefully designed multi-user simulations over the internet may be particularly useful for engaging certain segments of the population. (See *Implementation 6(b)*).

Challenge 2: The increasing U.S. budget deficit that is co-occurring with the beginning of the Exploration programs may negatively impact appropriations. This is particularly challenging for programs that are “front loaded”, such as the CEV program.

Strategy 2: Using industry “best practices” for program budget, forecasting, and returns, demonstrate that money appropriated for NASA will yield a national “return on investment” (ROI), quantifiable in dollars. Publicize the results early and often. Update as the program continues.

Implementation 2: Preparation of a business case, such as used in industry, might focus on the following aspects (as examples):

- a) Increased tax revenues from the aerospace and commercial sectors, generated as a result of increased employment and productivity at both the individual and corporate levels;
- b) Increased economic/market development as a result of technical innovations associated with the program (use Apollo-era and subsequent data to support)

Challenge 3: The U.S. form of government provides for periodic elections with the potential to rotate politicians with varying ideologies, philosophies, and appropriations goals in and out of the House of Representatives, the Senate, and the Presidency at frequent intervals. This makes it difficult to sustain programs over time.

Strategy 3: Develop and maintain a national commitment to Exploration that supercedes the political process, or at least maintains a sufficient majority in Congress to guarantee sufficient across the lifespan of the program.

Implementation 3(a). Apply marketing expertise; i.e. treat the assessment of how to market to each successive Administration and shifts in Congress as a professional market analysis. Initially view the Presidency, Senate, and House of Representatives as three different segments of a “political market”. Identify market needs (“pulls”) and drivers (“push”). Map the relevant characteristics of each segment. Identify similarities and dissimilarities among the market segments. For example, a similar market need across each of the three segments may be to create jobs among constituencies and to be publicly identified as doing so (i.e., “get the credit”). One possible response would be to develop a clear “marketing strategy” to address that need. This strategy might be based initially on developing sector-based employment models on the basis of (a) historical programs such as Apollo, Shuttle and ISS, and (b) anticipated workforce/job skills requirements for Project Constellation. The resulting jobs profile could then be mapped to each Congressional district. The information could be published in information pieces and government reports. For the Office of the President, publicize the anticipated national total of jobs created and the national/international economic/market increases associated with the program. Identify possible secondary markets resulting from new technologies and industries. Update the models continually, across the life of the program, and publicize widely.

Implementation 3(b). Identify current political issues, and consider how the programs at various stages of development might address those. For example, a major issue in the political landscape in 2004 is the issue of outsourcing. How might the CEV program address or help outsourcing? Track political issues that can be addressed by the program across the lifespan of the effort. **NOTE: There is a clear distinction and a warning to be made here between identifying and publicizing the manner in which a program or programs may address issues, and tailoring the program to do so.** Recent history provides lessons learned regarding the inevitable consequences of driving the development of complex technical/operational programs in response to changes in the political winds (CAIB Report, 2003).

Implementation 3(c). Encourage, develop and maintain constructive relationships between other government agencies with direct interest in the National Vision. In addition to the obvious benefits that may accrue from cost-sharing, those agencies with broad public and private industry bases will help gain political buy-in.

Challenge 4: There exists no clear “Space Cheerleader” at the national level. This person could also be responsible for directing space policy, coordinating among government agencies, and interfacing with international entities in support of the Exploration Enterprise.

Strategy 4: Reconstitute the National Space Council or something like it and charge it with the development and execution of political policy, including inter-agency cooperation, associated with the National Vision.

Implementation 4: Conduct a national search and name as Chair a leader of national stature – preferably someone with high credibility quotient who is not a party partisan. In close cooperation with NASA, this office shall coordinate and facilitate the relationships and cost sharing described in 3(c), above.

Challenge 5: There exists no obvious national/international imperative to generate support for the program, such as in the 1960’s “Space Race” with the U.S.S.R.

Strategy 5: Identify some national imperatives. Educate the public. Publicize.

Implementation 5: According to the board chairman of [the World Information and Technology Services Alliance](#), the United States graduated approximately 57,000 engineers in 2003 (down from 2002) as compared with 200,000 graduated by China. The American Association for the Advancement of Science and the National Science Foundation have noted similar disparities in scientific and other technical fields. Recent testimony by a prominent member of IEEE before a subcommittee at the House of Representatives detailed the loss of highly technical, “white collar” jobs overseas and described this as a direct threat to national security; a perspective that should be further explored and might provide fertile ground for extensive public discourse (Hira, 2003). The national space program of the 1960’s resulted in an historical increase in science and engineering college enrollments and graduations over the succeeding years. Data derived

from those years and from workforce/skill set models developed in support of the Exploration Enterprise (or as suggested under *Strategy 3*) can be used to persuade policy makers and the public of the national imperative for a program that creates similar effects.

Challenge 6: According to polls, there is weak public support of the National Space Vision.

Strategy 6: Develop an aggressive, decades-long public relations campaign based on sound market surveys/analysis and upon a philosophy of “direct involvement” for the public. Begin immediately.

Implementation 6(a). It will be critically important to the Sustainability of the Enterprise to understand the true indicators of public opinion, both positive and negative, rather than to rely on past experience from a different time the historical life of the nation. For example, a question such as “What would make a new Space Program important to you?” is likely to yield different answers from different demographic groups. One set of differences could emerge between people who lived through the Space Program of the 1960’s and those born afterward. No one currently at the age of 32 years of age or below was alive when humans were walking on the Moon. Furthermore, it is those very people who will be required to sustain and pay for the Program. It is critically important to understand what drives these different cohort groups and their effects upon public opinion and political interest, rather than to simply “guess”.

Polling as a survey method is well practiced in the federal government. To the extent that it is necessary given NASA’s constraints, sharing or offloading the responsibility for gathering such data with entities such as the White House and the national media could be explored. Commercial/industrial partners might also be helpful in this regard.

Implementation 6(b). On the basis of the results of such surveys, and drawing upon other data and considerations, develop a Public Relations campaign. Elements of the campaign might include the following:

- i. Development and marketing of computer games or on-line simulations designed specifically to engage people in involving, creative “work”, strategic planning, and gaming associated with mission development and execution. Phase the release of these products to anticipate each phase of Project Constellation by 6-12 months.
- ii. Development of a coordinated Program of documentaries, feature films, educational programs, etc., in cooperation with professional commercial production groups, to be distributed nationally via mass media outlets.
- iii. Development of national and regional ad campaigns directed specifically at demographics and interests/motivations of the public, intended to generate support for each program under the umbrella of the Exploration Enterprise, and for the Enterprise itself
- iv. Publicize program successes immediately and often.

Implementation 6(c). Address the “short attention span” of the public. A Public Relations campaign such as described in 5(b) should be planned so that it is calculated and phased in tandem with the actual maturation of various missions associated with the Exploration program(s) and “fills in the gaps” when little publicly-visible activity is taking place.

Proactive Strategies

Anticipating challenges and developing strategies to address them is an essential aspect of a Sustainability program. However, it is equally important to develop or leverage ongoing activities that may have multiple goals independent of Sustainability but can be effectively leveraged. Some ideas are provided below.

Strategy 7: Gain the support and active involvement of the larger U.S. business community, beyond the “traditional” aerospace (and related) companies.

Implementation 7: Proceed with the stated NASA goal to develop new ways of doing business, encouraging new applications of existing technologies or products. Examples include:

Implementation 7(a). Use commercial sources and practices. An obvious candidate for partnering with NASA is the commercial launch business. However, in order to build broad-based industrial support, it is important to search for ways to involve other business sectors in the development of an industrial infrastructure – a true “space economy” - that can support space exploration on a commercial basis. One pathfinder could be the development of robotic capabilities to mine metal on the surface of the Moon. There are currently several companies developing robots; commercial bids could be solicited and NASA could carry out a “buy”, rather than a procurement. With Congressional approval, companies would be incentivized to do business on the Moon with tax credits, such as are offered by several states and municipalities in the United States. Companies retain all rights to robotic capabilities that can then be licensed back to NASA or to other contractors as needed for future missions, as well as further developed for the commercial market on Earth.

Implementation 7(b). Enable the Growth of Small Business. “Growth” is the key word here, rather than “funding” or “inclusion”. Under “business as usual”, the majority of small businesses associated with NASA (and other government agencies) are relegated to the role of “subcontractor” to the major aerospace companies. As such, their contributions are directed by and frequently limited to execution of specific tasking under the WBS of the larger government contract. Yet, independent small businesses represent 99.7% of all employers, employ half of all private sector employees, generate 60 to 80% of net new jobs annually, and with regard to innovation produce 13 to 14 times more patents than large businesses (Small Business Administration). Providing mechanisms for small business to “stand alone” and enter the Exploration Enterprise on the basis of innovation and technical achievement, rather than on teaming, has the potential for major benefits to NASA. In addition, “seeding” communities with small businesses that are

leveraging their capabilities to support the new space program(s) may have significant positive effects on public support of NASA's efforts, as 60 million Americans are employed by small businesses. In addition, small businesses have developed effective lobbying capabilities in Congress.

Strategy 8: Put the National Vision for Space Exploration into education curriculums across the nation.

Implementation 8: NASA's myriad educational programs incorporated in its "Education Enterprise" are undergoing constant development. Many have evolved in tandem with the Shuttle and ISS programs. New educational materials need be developed that are explicitly related to the National Vision. Further, NASA can expand its educational "reach" by teaming with commercial companies to produce educational programs and documentaries that are linked to curriculums and associated materials for K-college (see Implementation 5(b)). These in turn can be coordinated with media events and the broader public relations effort.

In Closing

In summary, it is our belief that sustaining the Exploration Enterprise over a 30-40 years timeframe will require the development of a tightly coordinated "Sustainability Program" that will remain in place for the lifespan of the National Vision. The development of such a program – unheralded in NASA history - will best be served by the formation of a focused, dedicated team utilizing interdisciplinary perspectives and experienced practitioners from many fields. The team will need to be continually refreshed and possibly reconstituted across the life of the program in order to "keep current" with changes in the public, political, media, business, and educational environments. In addition, it should rely to the greatest extent possible upon professional market surveying and analysis techniques in order to acquire and make best use of data reflecting public and political issues. To the greatest extent possible, this effort or something like it should begin immediately. Of all the challenges facing these programs across the next 30-40 years, the issue of sustainability may be both the least understood and the most critical for the success of the National Vision for Space Exploration.

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