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## **From Earth to Mars: A Cooperative Plan**

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### **Introduction**

Figuring out how to pay for the mission is but one problem facing a manned flight to Mars. Who will pay and who will benefit from the mission is another problem. While Mars advocates push for a manned mission to Mars and even have plans for such a mission, the issue has not yet attracted the interest of either the public or private sector. Furthermore, there are issues facing our society that would discourage government spending on this project, especially since the availability of public funds is limited. At this time, the public is far more interested in terrestrial issues than the manned Mars mission. This paper examines these significant obstacles to a Mars mission and concludes with suggested guidelines for a successful partnership between the public and private sectors.

### **Why a Manned Mission to Mars Is So Daunting**

Placing humans on Mars is daunting for many reasons. Some of these reasons include the technical and engineering challenges as well as the exorbitant costs for the project. At the present time, there is uncertainty about who will fund such a mission and where the money will come from. For example, is the private sector going to pay for a manned mission to Mars and, if so, who in the private sector will pay for it and how will the investment be returned? If the public sector pays for the mission, how will it do so? If the mission is to be paid for by a combination of the private and public sectors, how will the funds be allocated and how will the private sector realize a profitable return for its share of the mission costs?

In today's world, public budgets and allocations are stretched in various ways, and different types of projects compete for funding. Most publicly funded projects have strong advocates behind them, both among the citizenry and in Congress, and many of these projects are deemed essential for many segments of the population. Just where funding allocations for a manned mission to Mars would fit into the budget is unknown, but to many people it is far more important to take care of our needs here on Earth than to worry about putting people on Mars. So far, funding has not been an issue because no credible plan for a manned mission to Mars has been put forward. Should such a plan come to fruition, however, it is going to face opposition from the politicians and the

people unless reasons for undertaking the Mars mission are clearly explained and made available to everyone. The reasons and explanations must be compelling.

Government support for the manned mission to Mars is essential, even if the private sector is a significant participant in all aspects of the project. Whether NASA's and the government's influence on space matters is deserved or not, the fact is that everyone looks to these entities to approve new space projects. A space mission that is not endorsed by the government or its primary space agency, NASA, is extremely difficult to plan, finance, market, and initiate. At the present time, there is no support from the government or NASA for a manned flight to Mars.

A further reason that makes this Mars mission so daunting is that private-sector benefits are questionable. Simply put, sending humans to Mars is not a priority for businessmen and women unless they can clearly see a way to benefit from their investment. Nor is sending humans to Mars a priority for politicians in the United States or elsewhere.

### **Missing Factors**

Important qualities are missing in both the public and private sectors that would allow for the development of a Mars mission. Some of the qualities overlap the two sectors. Certainly missing from the public sector is commitment and actual budget allocations for the mission. The citizenry, and officials in government, must be educated about the benefits of a manned mission to Mars. In similar fashion, missing from the private sector is commitment and, in particular, a willingness to play a significant role in the actual mission. Furthermore, those in the private sector need to understand the potential benefits of the mission and how these benefits might generate future value for shareholders.

The opportunity to set a national priority or goal for placing humans on Mars rests with the public sector. Yet there is simply no national leadership or will to energize and mobilize toward such a purpose. Without the support of national leadership, such a mission would be virtually impossible to undertake. Inspiring leadership can make possible extraordinary results. In the case of the public sector, an entire economic powerhouse can be directed toward this mission if its leadership is effective and convinced of the project's value. Such leaders would clearly explain the purpose, the why's and how's of the mission and with the people by his side, see the mission through to its conclusion.

President Kennedy inspiringly led the nation in seeing that there was value in going to the Moon. Later, toward the end of the Apollo program, other national issues took priority over continuing with Apollo and the national leadership of the time no longer connected Moon trips with value for the country and the people. Thus, the Apollo program disappeared as its previously strong support waned. In the years since the end of Apollo, our political leadership has not even attempted make a case that there is any value in returning to the Moon. Putting humans on Mars is even more abstract for most people than returning people to the Moon.

In addition, there is currently no national or public effort to make an investment in such a venture, nor are there any budget allocations for even planning a manned mission to Mars. Certainly there are budget allocations for robotic and scientific missions to Mars. Investment also continues to be made in a public space program comprising low Earth orbit, asteroid, lunar, Mars, and other planetary and exploratory missions. Hopefully these space program investments will produce useful and important data that will someday contribute to our putting humans on Mars. Without specific national investments and budget allocations, however, it is doubtful that a manned mission to Mars can even begin its development stage.

Also missing from the public sector is an effort to educate the people about the importance of putting humans on Mars. Part of this educational process includes government establishing a value-based connection with the people for sending humans to Mars. A near-term manned mission to Mars currently lacks sufficient value in all levels of government so it is unlikely that there will be a strong push for a manned mission to Mars educational program.

Regarding the private sector, some of the same components are missing, such as leadership, education, commitment, and acceptance. Unfortunately, the private sector has been conditioned to believe that our space program is the proper function of government. This is to be expected since the commercial space industry of today, while highly profitable and successful, was initiated by government policy and acts of Congress. In addition, space commercialization developed on a dual track with the military's usage of space and communication satellites, even to the extent of using military rockets for all commercial satellite launches. The private sector simply is not prepared to lead the way with something as unique, costly, risky, and new as putting humans on Mars. It still looks to the public sector for leadership, support, and encouragement. Thus, there is no private-sector leadership that can do what public sector leadership has the opportunity to do. While the opportunity does exist for developing private-sector leadership in this field, it is not within the culture of the private sector at this time to do so. This fact needs to change before the private sector can help lead the way to putting people on Mars.

It is also important to realize that the private sector does not yet agree that a manned mission to Mars might offer potential benefits and profits. The private sector is simply unable to convincingly move past the cost and risk factors, the technical and engineering issues, and the precedent that an important space mission is the responsibility of the government, though the private sector may obtain lucrative government contracts for work on the project.

Finally, just as government leaders must convince taxpayers, leaders in the private sector must convince their shareholders of the mission's value. The high cost of the mission will make this all the more difficult. Shareholder value is of paramount importance, especially in our current economic climate. While it is possible to demonstrate how investing in a manned mission to Mars can contribute to shareholder and public value,

such efforts are not underway at this time, largely because there is no manned mission to Mars on the planning board.

### **Barriers to Private-Sector Investment**

When the private sector does participate in a manned mission to Mars, the investment should be based on standards that are used for a terrestrial investment of similar risk and character. There will be stringent requirements for any company to earn an acceptable return on investment, net present value, internal rate of return, and a payback on the investment. The existence of a suitable exit strategy is also important. Delay factors will also need to be included in the financial analysis. Furthermore, without NASA leadership or policy advocating a manned mission to Mars, companies will have difficulty raising capital for the project.

Still another financial barrier for the private sector is the fact that there is no clear profit potential for a Mars mission. There is entertainment, media, sponsorship, and advertising potential for the trip to and from Mars as well as for the stay on Mars; however, the market and expected revenues from these activities is largely uncertain. The absence of a more certain profit potential adds to the difficulty in raising investment capital for such a mission, but on a more basic level it simply thwarts most private-sector interest in the mission as businesses focus their attention on more realistic and potentially profitable ventures.

Investment capital appears to be plentiful at the beginning of the twenty-first century, but it is still a finite resource. Unless a company or individual decides to invest in the Mars mission regardless of all other factors, investment capital will most likely go to the venture with the most profit potential for the least amount of risk. Terrestrial investments will almost always have the advantage in attracting investment capital. In addition, terrestrial investments have the least amount of risk since the infrastructure already exists on Earth for business ventures and transportation, the political risks are usually known, the legal environment is more certain, and, in most cases, new technology and engineering requirements are unnecessary.

### **The Benefits of a Mars Mission**

Despite the problems associated with putting humans on Mars, there are also benefits to be realized from such a mission. Both the public sector and the private sector have unique ways of benefiting from a manned voyage to Mars. Public-sector benefits include increased employment, the allocation of resources away from weapons to a space project, new technologies, scientific discoveries, and higher tax revenues. Some of the private-sector benefits include goodwill and a favorable public image as well as increased revenues and opportunities for corporate growth.

High-paying jobs and employment opportunities will result from a Mars project. For example, maintaining and flying the Space Shuttle involves five NASA centers and approximately 25,000 high-paying jobs. A manned Mars mission has equal or greater potential for similar employment opportunities within both the public and private sectors.

Another important benefit would be the probable allocation of resources away from military and weapons projects to the Mars project. Resources and talent will be dedicated to designing and developing the Mars mission.

New technologies and scientific discoveries, including medical discoveries will certainly result from the Mars mission. Many of these benefits will flow into the commercial sector worldwide. With the private sector involved in this mission, there will be a high incentive to incorporate these developments into new products as soon as possible.

There are also advantages that would accrue to a country on the leading edge of this type of technology and science. Not only do its businesses become the first to benefit from developments and discoveries, but as profits are realized tax revenues would increase. The possibility then exists for using these new tax revenues to produce social benefits.

The discoveries made and the knowledge learned from having humans on Mars would help us to understand, protect, and control our planet. We certainly gather valuable information from missions that utilize robots, but such missions cannot accomplish what properly trained humans can learn by going to Mars and exploring the planet firsthand.

For the private-sector companies participating in the manned mission to Mars, the government can initiate policies that provide them with noncash tax and other incentives, which can certainly minimize or buy down the risk and add to the expected rate of return for their investment. Such use of economic incentives to support private-sector investment has long been a tradition in opening up new industries—the development of the railroads and civil aviation are primary examples.

Laws or policies should be adopted which provide private-sector companies with limited exclusive use of the technologies derived from the Mars mission. This type of licensing might be controversial. Some would argue that technologies and products partially funded by public monies belong to everyone, not just certain private-sector companies. Limited licensing would, however, be an important incentive for a company to make an investment in the Mars mission. In a similar context, exclusive media, entertainment, advertising, and sponsorship rights should be granted to those in the private sector who invest in Mars missions, both the initial mission and a subsequent mission

There are intangible benefits for private-sector participants as well. A favorable public image and goodwill are important for companies in today's economy. Also, there would be numerous public service opportunities for the companies involved in the Mars mission to make presentations to schools and to use college-level presentations for important job recruiting. People everywhere would have a positive impression of companies helping to send a manned mission to Mars. Most companies could not afford to buy the type of goodwill and image-producing advertisements that would accrue to participants in the Mars mission. Such important benefits can readily be understood by the corporate decision makers.

## **The Guidelines for a Cooperative Venture**

The Cooperative Venture involves the public and private sectors working together to create, finance, and implement a program to put humans on Mars. The guidelines for the program are outlined below and apply equally to both the public and the private sectors. The discussion builds upon the information already examined in this paper.

Essential to this public- and private-sector partnership is the necessity of both sides to understand and appreciate the unique qualities that each brings the mission. Together they must be able to explain these qualities and the benefits of the partnership's mission to their respective constituencies. The two partners must be synergetic in their relationship with each another and with the citizenry.

This new cooperative partnership needs to adopt an educational program for all school children regarding the benefits for putting humans on Mars. One component of the partnership's educational program should be to provide scholarships for both teachers and students to attend the myriad of commercial space and Mars conferences that are held each year. It is important for teachers and students to have exposure to the ideas and work being done to put humans on Mars. Understanding that opportunities exist in these new fields is something that needs to be explained to students. By attending professional programs they will learn firsthand about new opportunities and careers in space. Many of these students will prove to be strong supporters of the Mars and other commercial space programs. Some will even choose careers in space.

Instructional material from these conferences and other space and Mars organizations needs to be made available to schools throughout the country. Video and cassette tapes of conference speakers and related programs should be available from a resource library that is designed to serve all schools as a public resource. Not only would the material be available to those interested, but it could also be used to supplement classroom material. This material would help show the feasibility of a social and commercial presence in space.

The Cooperative Venture is a joint effort to work together toward the common goal of getting people to and from Mars, so it is important that whatever incentives offered to the private sector work as they were intended. When designing these incentives, the public sector needs to work closely with the private sector to ensure success of the program.

The partnership's leadership must make sure that the project's value is known and appreciated by all. This is crucial, for without the support of the people, undertaking a project as large and as costly as a manned Mars mission will most likely stumble, if not fail. It will be difficult at best to fund the manned mission to Mars if the people whom the mission is supposed to benefit don't understand the benefits and object to money being spent on the project.

The Cooperative Venture also requires that both the public and private sectors work together in financing the project. However the partnership structures the financial parameters of the manned mission to Mars, both partners need to be financially committed and involved in the project. On the public side, while the government incentives are essential for private-sector involvement, incentives alone are an insufficient contribution to the partnership by the public sector. The public sector must also invest in the mission. The same holds true for private-sector participants. Investing because of government incentives is insufficient. The private-sector participants must share the risk with the public sector and not limit their investment to the incentive benefits they receive from government.

Finally, because of its vast influence, NASA must be supportive of the Cooperative Venture and must not have any policies, along with those of other government agencies, that detract from it. This is true even if the venture is somehow made part of NASA or administered by it. NASA must truly be onboard with this program because it has the power to either make or hinder the Cooperative Venture's success.

## **Conclusion**

To obtain a meaningful public- and private-sector commitment and financial support for sending humans to Mars, changes must take place within our government, inside our educational institutions, among the people, and within the business environment. The fruits of victory will be apparent to all once a campaign is carried out that increases awareness of the issues presented in this paper. When this happens we will be ready to begin work on a manned mission to Mars.