

University of Canberra

Trevor Rodwell

MARS: An Empty Space or a New Place?

ABSTRACT

The study of the heavens and our own solar system has been part of human culture throughout our history. The planet Mars has been of particular interest and has been the topic of debate and storytelling more than any other. Now we are on the cusp of being able to send humans to the Red Planet, but there are more than just final technological problems to overcome. The will to go and public perception of such a mission will have to be addressed in the very near future.

This paper presents research being undertaken to highlight the economic and cultural issues associated with a human expedition to Mars. Research has shown that public engagement in future large-scale space missions may depend on some form of interaction with the project and, in turn, this engagement may be vital to the funding of these missions.

Within this paper I also outline the concept of a first human landing monument based on the principles of Land Art with the inclusion of a Time Space Recording as a means of involving the global population and thereby creating an environment of mutual support for art, science and culture within a shared space mission.

We know from monuments left behind from a bygone era that humans have studied the sky for millennia. In just about every culture there are examples of myths and legends concerning the cosmos and this fascination with space endures today and is manifested in the technological achievements of modern space exploration.

Although the stars have held a revered fascination for many people, it was the observation of the five wandering lights we now know as Mercury, Venus, Mars, Jupiter and Saturn that formed the basis of understanding our solar system.

As long as 2,500 years ago the Chinese were recording our planetary grouping and around 300 BCE the Greek philosopher Aristotle concluded that Mars must be higher in the heavens than the moon (Rayl, Dressing & Lakdawalla 2006a).

Serious observations of Mars and the other planets began with the invention of the telescope in the early 17th century with astronomers such as Johannes Kepler, Galileo Galilei, Christiaan Huygens and Giovanni Cassini undertaking major celestial studies.

As more knowledge was gained about the Red Planet it became a place of intrigue in popular culture with suggestions that it might even be inhabited. At the beginning of the 19th century many, rather ludicrous, ideas were put forward on how we might gain the attention of the Martians, for it was assumed Martian technology would be at least comparable with our own or, some suggested, even superior. The fact that they would be observing Earth seemed also to be taken for granted. Ideas ranged from creating huge geometric forms from different coloured vegetation to prove we knew about mathematics, lighting a 24-mile-wide circular fire in the Sahara Desert, or constructing huge mirrors to focus the sun's rays and burn numbers onto the Mars surface (hoping, we could presume, that no Martian was in the vicinity while this was in progress) (Rayl, Dressing & Lakdawalla 2006b).

The debate about whether Mars was inhabited progressed with the American Percival Lowell, who built his own observatory in Flagstaff, Arizona, being the most prominent supporter of the theory, claiming he had seen canals on the Mars surface that could only have been built by intelligent beings. However, many other astronomers disputed these claims and in 1909 observations from the Meudon Observatory near Paris and also Mount Wilson in California confirmed the canals did not exist (Lachièze-Rey & Luminet 2001).

However, the absence of canals did not necessarily prove the absence of life and the question of what Mars was really like was the subject of speculation in the popular media. The book *Parallel Unveiled: A Romance* by Alice Jones and Ella Merchant depicted Mars as a site of a feminist utopia whereas the *War of the Worlds* by H G Wells portrayed the Martians as

psychotic invaders. Other authors such as Edgar Rice Burroughs were prolific in their output of Martian stories and Ray Bradbury's *The Martian Chronicles* became the most widely read science-fiction book during the 1950s (Rayl et al 2006b).

Cinema produced heroes such as Flash Gordon, whose expeditions to Mars seemed to have no need for such paraphernalia as a spacesuit or breathing equipment, and in 1953, the first film version of *War of the Worlds* hit the screens. Cartoons produced *Marvin the Martian* and television came up with the series *My Favourite Martian* which ran for three years (Rayl et al 2006b).

What Mars was really like was partially answered in 1965 when the spacecraft Mariner 4 flew by the planet. The spacecraft captured only 22 images on the day of its closest encounter and these were disappointing for most observers as they showed a barren and cratered surface not unlike the Moon. Scientific equipment on board did manage to analyse the atmosphere which turned out to be composed mostly of carbon dioxide and was a lot thinner than on Earth.

In 1969 two more spacecraft, Mariners 6 and 7 flew past Mars sending back more data and in 1971 Mariner 9 went into orbit around the planet, followed in 1972 by two spacecraft from the Soviet Union, Mars 2 and 3.

Although Mars was not like many had hoped for, it was intriguing enough to continue sending a steady stream of spacecraft to probe for more facts. Several missions had landers descend to the surface, slowly building up a picture of Mars with an early history that may not be too dissimilar to that of Earth. Frozen water has now been found in the permafrost of the northern pole by the Phoenix lander in 2008 and ground penetrating radar in orbiting satellites has recently located more away from the polar region in areas that may be suitable for a human landing. The consequences of these discoveries are twofold. First, it again raises the serious question of did life ever exist on Mars or even could microbial life still exist below the surface? The second point is that if this permafrost can be utilised by a human mission for water requirements for the crew and maybe even converted into rocket fuel for the return journey, the cost and logistics of such a venture starts looking feasible.

The development of new launch vehicles and technologies for a return to the Moon by humans, and then to Mars is already underway through NASA, the European Space Agency and Russia. Other space emerging countries may soon join these ventures or start a new program of their own. In 2007, 14 space agencies came together to produce the Global Exploration Strategy, a framework for coordination, potentially providing hardware compatibility for major joint space ventures. In July 2008 at a meeting in Montreal, Canada, this framework was reviewed and led to the official establishment of the International Space Exploration Coordination Group (ESA 2008) and in December 2008, NASA and European Space Agency administrators reached an agreement to work together on joint Mars missions (Weiler 2008). In the not too distant future we may see the first human footprint on Mars.

Background to research

On 20 July 1969 humans made the first successful landing on another celestial body with the American Apollo 11 mission to the Moon. Prior to this, on 4 October 1957 the former Soviet Union launched the world's first satellite into Earth orbit, which in effect started the race to the Moon. During those years each rocket launch produced media stories that awed the world and public enthusiasm for anything concerning space was at a high. However, after 1969 when the almost unthinkable had been achieved, public enthusiasm began to wane. When the cash-strapped US government cancelled Apollo after six successful Moon landings, but before the entire program was complete, there was little protest from the public.

Space exploration did continue with Earth orbiting satellites and robotic spacecraft missions to various destinations in our solar system, but the general populous was hardly aware of the endeavours. More recently other nations have begun to establish space agencies and have cooperated in building the International Space Station. Currently plans are being developed and infrastructure is being built for a human return to space beyond Earth orbit. NASA's Constellations Program aims for a human return to the Moon by 2020 and Mars sometime later – dates have been suggested around 2035 (Brooks 2008). The European Space Agency has the Aurora program which aims for humans on the Moon around 2024 and then on to Mars. Russia has similar plans and in 2009 will start their Mars 500 Project which will put cosmonauts into a simulated Mars habitat for 500 days, which is the expected duration of a Mars surface mission (Hollingham 2008).

The will to send humans to Mars as the next major quest in human space exploration appears to be strong within many space agencies and associated organisations; however, governments supplying the money tend to look closely at costs and the public perception of such missions. Planetary scientist Jim Bell (2007) reflects on the post-Apollo decline in public interest in space exploration which is reflected today in NASA's reduced budget allocation by the USA Government. He states that our science and understanding of the planets absolutely requires human explorers and for this public and political interest has to be rebuilt.

Research

My research has been prompted by two salient points. First, there is a strong international groundswell, especially from the scientific community, for human space exploration to an interplanetary destination. At the present time Mars is the only logical planetary choice. The inner planets of Mercury and Venus are far too hot and the two planets beyond Mars (Jupiter and Saturn) are gas giants with atmospheric pressures that would crush a spacecraft long before it reached any surface. The planets beyond Saturn are simply too far away for a human crew with our current technology.

Mars, although very cold and with a thin atmosphere of mostly carbon dioxide is technically habitable for a long duration mission. Also Mars has the potential to confirm the theory of life in our solar system beyond Earth. Although this life may be microbial it would still have an enormous impact on the way we think about ourselves cosmically. The possibility of life having formed on Mars at some time is a proposition gaining credibility due to recent discoveries of vast amounts of frozen water trapped in the Martian soil and the knowledge that Mars in the past was much warmer than it is now and probably resembled Earth in many ways (Koerner & LeVay 2000).

The other aspect focusing my research is the public perception of space exploration and the necessity to rebuild public interest in human space missions if government funding of these programs is to be forthcoming. An example of public engagement affecting a space outcome can be seen in the British Beagle Mars Lander project. Colin Pillinger, consortium leader and lead scientist stated that public support was crucial in obtaining the funding needed for the project. Being initially turned down by the British Government, the project team enlisted the help of pop music group Blur and international artist Damien Hirst to raise the profile of the mission and bring it to the attention of the mainstream public. The weight of public opinion

eventually resulted in the British Government contributing a significant amount of money for the spacecraft, which was launched on 2 June 2003 (Pillinger 2003).

In a recent report by Dittmar Associates Inc summarising their field research, surveys and polls over several years on behalf of NASA stated that many members of the public, especially those in their early twenties, would require more interactivity in space missions for them to become engaged with the space program (David 2008).

A case can be made that public support for a major space mission such as a human landing on Mars could be crucial to the funding of such a project. Initial research also suggests that such support would more likely be forthcoming if the public could feel part of the program.

To this end I am proposing that an arts-based project can contribute positively to a human space science mission. Science and art, once partners in the evolutionary development of humankind have, in many instances, gone their separate ways. But as John Barrow (1995) observes:

Science and art are two things most uniquely human. They witness to a desire to see beyond the seen. They display the crowning successes of the objective and subjective view of the world. But while they spring from a shared source – the careful observation of things – they evoke different theories about the world: what it means, what its inner connections truly are, and what we should judge as important.

Maybe because of this many artists believe this partnership has never wholly ceased.

The issue to overcome with a human Mars missions is the perception that, like other space projects, it is only a venture in science. But Mars is a place, it is not an experiment! Neither is it an empty space. It has context, history, a reference in human mythology and cultural expression and, for all we know, life may exist deep under its surface. Despite this, some see the human exploration of Mars as the move to a new frontier ripe for exploitation. An organisation set up to promote this idea, the Space Frontier Foundation, advocate the opening of the space frontier to human settlement as rapidly as possible (Space Frontier Foundation 2008). Others, like Alan Marshall (1999) say what is really being promoted is ideology: the

ideology of frontierism that contains within its attitude to space expansion an entrenched ethnocentrism.

However this issue plays out in the future, the first human mission to Mars will be to prove we can send a crew to the planet's surface and return them safely to Earth. The science mission will primarily be to look for life, or fossils of previous life on or in the Mars surface. Answering the question of extraterrestrial life is the current driving force of planetary exploration. With the landing of the first humans on Mars we will have proved our technological capability, and science experiments will answer many questions about the planet. But when that first crew leaves, what will there be that will represent global human culture? And is it necessary to leave anything other than what would jeopardise the return flight?

Practical constraints would mean that any Mars camp and much of its life-sustaining infrastructure would have to remain, but it would be disappointing to say the least if this alone were to represent the interplanetary achievements of humanity in the early part of the 21st century. An examination of cultural and historical places of significance on Earth clearly shows a human predisposition for marking these sites with monuments. The site of the first human landing on Mars will be a place extremely worthy of a monument to this achievement. Therefore, there is justification to examine the question of an art component that would be a first human landing monument representing the people of earth who would be, in effect, shareholders in the mission.

Previous human missions to the Moon, so far the only time we have ventured out of Earth orbit, marked the first landing site with a flag and a plaque attached to one leg of the landing platform that was left behind on the lunar surface. Just before leaving the Moon one of the two astronauts tossed on to the dusty surface, rather unceremoniously, a small engraved silicon disc with goodwill messages from 74 heads of state (Rahman 2008).

This mundane marking of the first human expedition to another terrestrial body can be contextualised by the fact that there were severe weight limitations imposed on the first landing mission and the astronauts spent only 2.5 hours on the surface, therefore time was extremely valuable with every minute pre-planned. Scientific projects took priority over time-consuming symbolic activities (Rahman 2008).

A human mission to Mars would be very different. For reasons of alignment between Earth and Mars, the duration of the surface stay on Mars would be around eighteen months; plenty of time for the installation and dedication of a first human landing monument. However, one key point to consider is that wherever the landing site is, no one, other than astronauts, will ever be able to see the monument in its actual location. Could a copy, physical or virtual, being out of context, do justice to this extraterrestrial artwork?

The nearest corollary to this on Earth could be provided by artists working in the area of Land Art, where often their work is in isolated and, in some cases, almost inaccessible environments. Documentation, in some form or another, is usually the only way the public will view the work, especially if it is also ephemeral.

To many of these artists, the environment in which their work is situated is critical to the concept and understanding of the work. It is this factor, the intimate link between artwork and environment, where the environment is an integral part of the artwork that would make a Mars first human landing monument ideally suited to this artform. This would then become the first installation of extraterrestrial Land Art.

Land Art has almost become a generic name for the many varied and subtly different forms of art in the natural environment. These forms are variously called environmental art, art in the landscape, earth art, earthworks, sited sculpture (Beardsley 1998) ecological art and ecoventions (Lintott 2007) and landscape art (McGrath 2002). However, in general writing on the subject the term Land Art is used extensively to cover the conceptual meanings of the others. Because Land Art is outside of the gallery and the urban environment (art in this area is generally known as Public Art) and has laid claim to the very fabric of nature, it has invoked conflicting views on its relevance. Robert Hobbs, writing about the work of Robert Smithson stated that 'because the artworks are often not known directly, they can become subjects for rumour and consequently assume a mythical status' (Hobbs, Alloway, Coplans & Lippard 1981). Others have written about the artform in almost poetic terms. 'Artists in the environment acknowledge the rhythms of formation, erosion, submergence and decay, and work with them' (Spivey 2005). 'They make the immensity of the cosmos part of the artists' field of vision and make people think about the interdependence of people and planet' (McGrath 2002).

Land Art is in large measure about the landscape itself – its scale, its vistas, its essentially horizontal character, its topography and its human and natural history. It reveals the changing characteristics that a work assumes in different conditions: diurnal or nocturnal light, winter glare or summer haze, full sun or cloud shadow (Beardsley 1998).



Written on the Land, Land Art Installation, by Trevor Rodwell and Sue Rodwell
Palmer, South Australia, 2008

Not everyone is in agreement with the methods used by land artists in what Catriona Moore (2007) describes as art that combines social and environment engagement. Critics have raised the issue of the artworks marring the land in their construction and placement (Beardsley 1998) while others go even further, developing the ‘positive aesthetic thesis’ (Lintott 2007). This rules out the possibility of improving on nature’s aesthetic value and implies to some critics that Land Art changes the environment from being a part of nature to being part of an artwork, and not for the better. Allan Carlson, who subscribes in large part to this theory, claims that to redefine nature as part of an artwork is an aesthetic affront to nature (Simus 2007).

Emily Brady (2007) calls this a short-sighted attitude and states that this implies that artists can never add aesthetic value to a non-modified environment. Her position is that there are good examples of art mediating positive relationships between humans and nature and in these cases the artists have shown an aesthetic regard for nature.

Some conceptual issues that artists working in the area of Land Art focus on are to do with terrestrial environmental problems. For example: the degradation of wilderness areas, urban

sprawl or contamination of waterways. Other issues reference the plight of indigenous cultures, the extinction of animal species, the arbitrariness of land borders or the historical aspects of migration and land settlement. These are big issues that can be understood locally and, in some cases, globally but would have little application on the surface of Mars. They are internal to planet Earth.

To relate meaning within a cosmic environment concept would have to relate more to how we perceive ourselves as space beings, our ambitions as a human race towards expansion into the solar system or our quest for knowledge from the stars. These are concepts for anyone, anywhere on Earth who has ever looked up into the night sky and wondered about its meaning.

On the design and construction side of an extraterrestrial Land Art Monument, the Martian environment would have to be carefully considered; what may work here may very well prove unviable on Mars. The design of the artwork will have to be undertaken without ever visiting the site and installation will be done by someone in a spacesuit. The artist, normally in control of choosing the precise location for the artwork and its construction, becomes project manager linked to an astronaut millions of kilometres away. Restrictions on weight and stowed size, exposure to extreme cold, cosmic rays and ultra-fine dust will prove challenging for any concept design. On the plus side, low gravity and atmospheric pressure will mean less robust structures can be utilised than would be possible on Earth.

As part of the extraterrestrial Land Art Monument, I am proposing the inclusion of what I call a Time Space Recording as a device for global public participation. A Time Space Recording is based conceptually on a time capsule. However, the popular notion of time capsules is for the storage of artefacts which, because of volume and weight restrictions, will not be possible on space missions. There is already a history of Time Space Recordings which, according to William Jarvis (2003), are of a type that are extraterrestrial with an indefinite time span for future access.

The first of this type, left on the Moon by the two astronauts who made the first human landing on 20 July 1969, was a silicon disc of goodwill messages and a small plaque engraved with these words:

Here men from Planet Earth first set foot upon the Moon, July 1969 AD. We came in peace for all mankind (Rahman 2008).

In 1972 two spacecraft, Pioneers 10 and 11, were launched to study the outer planets. It was realised that these two craft would be the first human made objects to leave our solar system and may eventually, in the far distant future, be retrieved by the inhabitants of another system. To convey who and where we are, a plaque was attached to each craft showing a graphics image of our solar system, a pulsar map to locate our position in the Milky Way Galaxy and a line drawing of a naked man and woman standing in front of the spacecraft for scale (Sagan 1979; Watzlawick 1976).

Up until this point the creation of time space recordings were little more than metaphorical postcards – we are here, having a great time! However, in 1977, with the launch of the two Voyager spacecraft the opportunity for a major time space recording became apparent. Destined, like the Pioneers before them, to eventually leave our solar system on a one-way voyage to the stars, a decision was made to incorporate a message to whomsoever may find them in the future (Sagan 1979).

In an era preceding efficient digital recording a way was devised to record images on an established audio technology phonograph disc. Using both sides of the disc and slowing the speed to 16 3/8 revolutions per minute a large amount of recording time became available (Sagan 1979; Weisman 2007).

In a way, this was a watershed moment. For the first time in human history we had the means to encapsulate who and what we are and send that showcase deep into our galaxy. In this attempt at extraterrestrial communication only one thing was certain, if it was ever retrieved by another species they would know nothing about us and our way of life. According to Carl Sagan (1979) and the team who put the contents together, the prospect was daunting. It was also speculated that once in deep space the record could survive for more than a billion years, making it a possibility that it could end up as the only human expression of art and culture left after the demise of us and our planet (Weisman 2007).

This may seem a negative prediction, especially with scientific opinion indicating that our sun is probably midway in its life cycle and the prospect of it expanding into a Red Giant and

destroying the inner planets of our solar system, including Earth, should not happen for another five billion years (Tillett 2002). However, the prospect of a cataclysmic event extinguishing all life on our planet, or self-destruction with one of the many forms of weapon we have developed, or a pandemic of global proportions killing us off in the next one billion years, is uncertain. The Voyager discs may yet prove to be our swansong (Weisman 2007).

The final contents of the records were 118 pictures, greetings from the President of the United States of America and the Secretary-General of the United Nations and other greetings in 54 languages, various sounds of Earth including a whale song and 87.5 minutes of music (Sagan 1979; Weisman 2007). Also, in the run out groove on the record a recording technician had added his own personal message – ‘To the makers of music, all worlds, all times’. Such is the unquenchable desire of the individual to communicate.

Since those times there have been a few notable time space recording events and following are two examples The Planetary Society in conjunction with JAXA, the Japanese space agency, created the ‘Wish upon the Moon’ project accessed via the Internet. Those who participated had their name and a very short message etched into a foil attached to the Japanese SELENE spacecraft now orbiting the Moon (JAXA 2007).

The Planetary Society also organised the ‘Messages from Earth’ project, a specially produced silica glass DVD incorporated onto the Phoenix spacecraft that landed on the northern polar region of Mars on 25 May 2008. The DVD contains around 250,000 names of people who accepted the online invitation to be included. It also contains messages and classical works of literature about Mars (Smith 2008).

Regarding public participation in these types of events, Jarvis (2003) claims that the self-evaluative opportunity of the sender can potentially be significant in that person’s perception of the world and their culture. Simberg (2008) takes a more pragmatic view stating that because of the many threats to humanity, both natural and human made, it would be beneficial to transfer some of our knowledge off-planet.

Jarvis (2003) also writes about this practical approach to ‘time encapsulate’ our era’s writings stating that the multi-millennial survival of the bulk of any age’s written records and imaged media is improbable. Like Simberg (2008) he believes that an inaccessible storage site off-

planet would be ideal. The idea of inaccessibility of contents is derived from a realisation that, unless secure, the contents could be contaminated, tampered with or stolen.

A Mars ‘first human landing’ Time Space Recording fulfils the requirement of being off-planet with regard to Earth and also in a secure long-term environment with the public able to contribute to the project via the Internet. Several recent Time Space Recordings have utilised the Internet for public participation but the content of each individual contribution has been small, a name and a very short message. In the case of the Selene spacecraft ‘Wish upon the Moon’ project the message had to be contained within 40 letters (JAXA 2007).

With the capacity to store digital information increasing significantly over short periods of time, the space available by the time a human Mars mission gets underway may be enough for every individual who wishes to participate to include photographs, writings, music, family histories etc as their contribution to this cultural Time Space Recording. This recording, as an integral part of an extraterrestrial Land Art monument, could focus public attention on the mission and help gain their crucial support.

In the document *LunAres: International Lunar Exploration in preparation for Mars*, a project by the International Space University, these concepts were touched on under the headings ‘Civilization Mission’ and ‘Humanity Mission’. The civilisation mission emphasised how humanity throughout the ages has left monuments, many of which are now considered great works of art, that mark new stages in the path of cultural development. The humanity mission talks about how people have thought about space and how they have communicated their ideas and messages. This segment concluded that the technology is available for the mass of humanity to compose their own message to be installed by humans on the next landing mission (International Space University 2004).

Conclusion

The concept of linking a sculptural First Human Landing Monument with a public Time Space Recording serves the purpose of introducing art onto Mars and enabling peoples of the world to feel part of a major historical event. This, I propose, would be as important to the population of Earth as any scientific experiment on Mars.

It is therefore justifiable to look at the benefits that might come to us by creating a Mars First Human Landing Monument. An extraterrestrial Land Art sculpture would place art firmly in the consciousness of space thought and indicate what we judge as important in our exploration endeavours. The Time Space Recording element would provide a great opportunity for the most amount of people to be involved in what will probably be this planet's greatest space endeavour. It could get people thinking about what is meaningful to them, what they would want to leave as an imprint on Mars. Schools might organise their students to produce a production for inclusion on the recording, thereby introducing the subjects of space science and communication in a very practical way.

The history and cultural significance of the Red Planet would be made known more generally and no doubt Mars would be seen as a place to respect in our pursuit of wondrous adventure.

As far as the Mars mission consortium is concerned, any activity that raises the profile of the venture in a positive and meaningful way can only help in securing the vital funding that will be needed for our leap into the solar system.

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