- items is unlikely. And the Moon can probably supply the Martian frontier with some items at a lower expense than they can be shipped from Earth. The Economic Case for Mars, presently mostly wishful thinking, gains a boost from the Moon being a customer. The reverse is also true.
- **The hardships and challenges of life on the lunar and Martian frontiers will bear many similarities, along with obvious differences.**
- **The pioneers will have left behind much**, forsaking Earth for a fresh start on a new world.
  - The ability to go outdoors without a spacesuit
  - Many outdoor forms of recreation
  - An ever increasing variety of consumer goods
  - Many food and beverage specialties
  - Many hobbies, even indoor ones, that cannot be supported on the frontier, at least not yet.
  - The endless list of tourist destinations
  - A very rich and diversified biosphere
  - Endless occupational options and opportunities
- **They will be chasing similar dreams, a chance**
  - to pioneer a pristine, unspoiled world
  - to be in on the beginnings, on the ground floor
  - to start over, fresh, and try new ways of living
  - o rise to the top rather than be lost in the pile
  - to find oneself, to be all that one can be
  - to appreciate more deeply what life is all about.
  - to pioneer new ways to be human
  - to take a barren world and make it fertile
  - to learn to be "at home" in a setting where no one could ever have felt "at home" before
  - to help spread humanity and life to the stars
- **They will face similar challenges, having to**
  - make do with different resources and tools
  - make substitutions for unavailable materials
  - make do without when substitutions won't do
  - respect alien, mindless dangers of the frontier
  - express one's artistic creativity in new ways
  - accept fewer change of scenery options
  - raise children where they have never been raised before, without access to all the variety of Old Earth they will surely learn too mush about.
  - develop new sports for new gravity levels
- **They must be made of the same "right stuff"**
  - resourceful,s, ingenuous, creative, adaptable
  - willing to make sacrifices
  - willing to try new ways to do old things
  - accepting the frontier as "home" soul-deep

Yes there are differences between the Moon and Mars, differences that do *matter.* Some equipment and systems will be unique and special to one frontier or the other. But that should not keep us from working to identify and maximize equipment and systems that can be standardized, at least in part, for use in both locations, saving finite money and funds for other vital expenditures.

Robert Zubrin's view that equipment sent to the Moon that is analogous to what will be needed on Mars, should be designed to work on Mars from the start, ***has considerable merit.*** Such a constraint would work to guarantee that we do indeed continue on to Mars, something vital to the long range viability of Lunar Settlement. This suggestion may be received grudgingly by many Moon-enthusiasts, but ***we all need to take the long view.***

The Moon Society sees the Mars Society not as a rival, but as *a logical partner in working to realize this vision.*

If some things get tested on the Moon first, that initial delay will greatly speed-up the pace at which the Martian Frontier successfully develops *over the long run.* But we have to work at it, to guarantee that both frontiers open and develop apace.

Patience? Not exactly. *Aggressively industrious patience,* yes! Impatience gets quicker results, to be sure, but far more often than not, those results are flawed and soon lead to failure.

So let us both, the Moon Society and the Mars Society, work together, cooperating and collaborating, helping each other achieve a shared, brighter, open-ended future. Yes, the Moon Society is focused on the opening of the Lunar Frontier. *But Mars loom large in our Field of View.* It is in this spirit, and with this hope, that the Moon Society cosponsored Mars Convention 2004 and will hopefully continue to cosponsor these events.

This vision is just the beginning. In time humanity will call all the Solar System home, and have begun to reach for the Stars!

www.moonsociety.org

A pdf file version of this brochure can be found at:
www.moonsociety.org/spreadtheword/pdf/mars.pdf

* The writer, while President of the Moon Society, is also a dedicated member of the Mars Society.

Mars is in our "Field of View"

by Peter Kokh

The Moon Society is focused on the Moon, of course. But

for lunar settlement to be truly viable, the Moon will need to tap resources it lacks in economically accessible abundance: industrially strategic metals such as copper, zinc, silver, platinum, and gold; and perhaps carbon and nitrogen-rich volatiles. The Moon also needs markets for its products other than Earth.

Mars first fans are quick to point out the resource-challenged poverty of the Moon. That established fact turns out to be irrelevant. Japan too, lacked many industrially strategic resources: coal, oil, iron ore, and more. So it *went out* and developed "markets" in resource-rich areas of the Pacific Rim, becoming rich and prosperous in the process. Japan is the model for the Moon. Our satellite does, however, start with the three most important resources of all -- "location, location, location" -- the Moon has it and Mars does not. But the story does not end here.

Greater Mars (with Phobos and Deimos) is a potential market for goods manufactured on the Moon, but, more importantly, a potential source of volatiles and strategic metals that can be shipped to the Moon for far less fuel cost than up out of Earth's deep gravity well. It is in the Moon's interest to promote the opening of "Mars PhD", *not eventually, but without delay, apace with the opening of the Moon.*

But it is also in the best interests of the future Martian frontier to have the lunar frontier develop side by side. Why?

It is difficult to conceive of an export product that Mars could market to customers on Earth: Mars has no resources in abundance that are scarce on Earth. Tourism? Who will be willing to take two to three years out of their life for a round trip jaunt to Mars, when most of that time will be spent coming and going?

Mars *does have* potential exports needed on the Lunar Frontier. In fact, without the Moon in the picture, it will be exceedingly difficult to establish any believable "Economic Case for Mars."

An Earth-Moon-Mars economy could work.

The Moon has three potential product areas that might be developed for direct sale to customers on Earth: microwaved-power, helium-3, and tourism. But beyond that,

any item that lunar industries develop for local, lunar, consumption, should be marketable to in-space markets such as LEO industrial parks and tourist facilities, at a cost advantage over equivalent products produced on Earth, given the 20:1 fuel savings advantage.

Again, what the lunar economy will be able to produce, and the extent to which it will be able to diversify, will be limited without cheaper sources of lunar-deficient materials than Earth. There is the opening for the Mars-Phobos-Deimos economy.

Mars will also benefit from immigration of Moon-seasoned pioneers. For experienced Lunans, Mars will be a walk-in-the-park. *A Lunan recruit will be worth as much on Mars as many recruits direct from Earth.*

Simply because of distance and frequency of launch windows, the lunar frontier will *initially* develop faster than the Martian one. Made-on-Luna equipment and supplies will be shipped to Mars at considerable fuel cost savings, allowing Martian hard currency credits to go farther, helping to insulate the Martian frontier from a cut off or cut back of support by benefactor governments and corporations on Earth - support that might be interrupted at any time..

Whichever world *you personally* would rather pioneer, it remains all but certain that the Lunar and Martian Frontiers will have an singnificantly better chance of successful development, each more quickly reaching viability should support from Earth dwindle slowly or be abruptly interrupted, *together* than separately.

It is more constructive to see Moon and Mars as natural partners, than as "us or them" rivals.

Well-intentioned enthusiasts who buy into the "Moon ***o***r Mars" debate, not only deceive themselves, but work for the failure of both initiatives.

Can we afford to open both frontiers? Let's rephrase the question: Can we afford to pick just one if it entails certain failure?

The Moon Society calls for the opening of both frontiers simultaneously, with new equipment (e.g. mining, processing, manufacturing; transport) ***and systems*** (pocket hospitals, air and water recycling, biospheric, etc.) ***for use on both worlds, tested on the Moon first, where rescue, resupply, repair are easy.***

This will provide a triple benefit for Mars.

1. New equipment will arrive on Mars with a much higher confidence and assured reliability level for use in a location where rescue and or resupply can be months or years away.
2. Development of such equipment and systems can be charged to the cost of opening the Moon, *greatly reducing the incremental cost of opening Mars.*
3. With new, debugged equipment from the Moon will come persons familiar with its use, proven pioneers, not untested romantics from Earth.

Similarities between Moon & Mars

- **Neither world has a breathable atmosphere** - we must establish self-contained mini-biospheres on both to house and support our outposts and settlements. There is no one-size fits all biosphere approach. "Modular biospherics" is the best approach, providing primary waste treatment at the point of source, to allow our biosphere encradled settlements to grow without trouble.
- **Neither world is well protected from "the cosmic elements"** - cosmic rays, solar flares, solar ultra-violet, etc. While Mars has significant protection from the incessant micrometeorite rain than the Moon, it is much more exposed than Earth, with our much thicker atmosphere. Outdoor surface activities such as construction will be hazardous duty when prolonged. Construction and assembly methods which minimize man-hours spent on the surface will be at a premium.
- **Both worlds experience very cold temperatures.** Lubricants and fuels and materials which hold up under those conditions are needed on both . The Moon has extreme heating to deal with as well, but to a lesser degree, so do Phobos and Deimos, also without atmospheric heat sinks.
- **Both worlds have dust management problems.** Is fine dust on Mars as intrusive and abrasive as that on the Moon? Not sure. But dust control measures are needed on both frontiers.
- **Safe, reliable modular nuclear power units, add-a-unit-as-needed, will be a big benefit on both frontiers.** Both worlds have solar power access, the Moon much more so than Mars. And Mars,. with little reason for optimism, may have some geothermal hot spots that can be tapped.
- **If a treaty banning shipment of nuclear fuels through Earth's atmosphere** were ever enacted, fuel for nuclear power plant units, and for nuclear propulsion rockets, can tap substantial Thorium deposits on the Moon, using fast breeder technology to process this into fissionable U-233. Such a lunar industry would benefit both frontiers.
- **Both worlds are without road networks** - infrastructure is expensive, labor intensive - on both we'll need pressurized all terrain vehicles, that can travel fairly fast of boulder strewn stretches.
- **Lavatubes for ready made shelter are expected to abound on both worlds**, for settlements, warehousing, industrial parks, etc. Construction inside them benefits from substantial in place regolith shielding. Workers can use light weight, light duty, unhardened space suits, and need not worry about "outdoor radiation exposure times."
- **Areas of subsurface ice**, or frozen soil, are expected to exist on both worlds
- **Both worlds are more economically challenged by themselves than if they trade goods and services** and work together to develop other "in space markets" to further the rise of an interplanetary economy that could withstand interruption of support from Earth. Mars, Phobos & Deimos will be cheaper sources than Earth for things the lunar frontier cannot provide for itself, while the development of markets on Earth for these same