THE SPACEFARING WEB
MARS: THEMES AND VISIONS

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The Spacefaring Web is the space movement's longest-running opinion column, currently in its third year of biweekly publication. While each article stands alone, it is also a node in an expanding network of thought on the cultural role of space. "The Spacefaring Web" is title, subject and thesis, making the case for a decentralized, open approach to expanding into the cosmos, in sharp contrast to the single-point government programs of the past.

The column has had several purposes: to advocate and describe an approach to the enterprise of space settlement growing from network relationships among autonomous nodes, in contrast to the hierarchical command efforts of government space programs and the consumer-entertainment models sometimes advocated as an alternative. It has sought to bring cultural issues into the science-driven discussion of our future in space, from political theory to marketing. First and foremost, it was intended as a goad to encourage other space advocates to write, publish, and publicly argue for their own views, raising the public visibility of space settlement all around.

Just as it has in our night skies, Mars has waxed and waned in The Spacefaring Web during its first two years. The column started under the title "MarsNow," as a rather bookish essay sent twice weekly to a small list of personal contacts. It quickly broadened in scope and distribution, to focus on an array of social-science issues related to the opening of the space frontier, and to viral growth in its reach, abetted by publication in the space news outlet, SpaceDaily.com.

A few themes of The Spacefaring Web recur through these Mars essays, illuminated from different angles in the light of contemporary events, from missions to movies to serendipitous bookstore purchases. As the overarching context of all the columns taken in sequence is missing from this compilation, this introductory essay will fill in some of the gaps from the omission of discussions of O'Neill colonies, startup rocket companies, private military contractors, space tourism and SETI, all of which teased out the binding threads of The Spacefaring Web.

No More Apollos

A generation ago, the public expectation of a spacefaring future was embodied in the movie *2001: A Space Odyssey,* with its vision of orbiting hotels, moonbases and a human mission to Jupiter. As that year finally rolled around, a popular television commercial referred to its vision, asking "where are the flying cars?" Enthusiasts wondered, how can we reclaim that *2001* future? The first issue of The Spacefaring Web answered, we can't get there from here. No new crash

programs to Mars or Jupiter, no governmental Moon bases, no gray-suited techno-optimism any more.

What happened to the engineering-driven spacefaring future accepted as a given in the previous generation? We - or the Baby Boom generation shaping culture - rejected it. The rejection was not of technology: technological development if anything accelerated and transformed our lives in ways unimaginable in the 1960s. An ideology was discarded, that of technocracy: the uniquely 20th Century view that authority should be strictly hierarchical, and that expertise, rather than consensus, conveyed the authority to make decisions.

"Socialist" and "capitalist" states alike shared those concepts, arrogating authority to themselves, basing their legitimacy on "scientific" principles, be they Marxism or management theory. In America, a technical-governmental elite radically transformed the landscape of the American West, for good or ill damming its rivers, irrigating its deserts, and radiating its wilderness with nuclear tests. Scientists and engineers for the first time received political and social deference. Often, they were wrong, telling the populace that nuclear tests were safe, that computer analyses showed that the war in Vietnam was winnable. In the Soviet Union, the system was taken to the extreme of environmental destruction and public deception.

Both states also showcased space programs, explicitly presenting them as symbols of the power and legitimacy of their technocratic leadership. Little wonder, then, that as Vietnam, thalidomide and DDT destroyed public faith in technocratic leadership, the space program was dragged down as well. 1972 saw the first Earth Day celebrated as a public backlash against technocratic values of mastery over nature, the cancellation of the last Apollo missions, and the beginning of the Watergate scandal that dethroned the last successfully technocratic presidency, that of Richard Nixon. All these events were directly related.

There has been no subsequent substantial space effort because technocracy remains thoroughly discredited while no alternative approach to space has succeeded. In the United States, no governmental technocratic initiative outside the military has succeeded since Nixon, despite the best efforts of President Clinton in an area of much broader concern than space, health care. The social sciences have long since abandoned the simple certainties of industrial-era mass control and simplistic rational-actor models. Communications technology has transformed hierarchy from an efficient tool to a dead weight. Giant hierarchical enterprises have failed or fundamentally transformed, from the Soviet Union to IBM to the United States Army. Technocracy is deader than Stalin, and along with it any prospect of an "Apollo II" road to space.

The recent report of the Columbia Accident Investigation Board and its political reception should close debate on the matter once and for all. The report clearly states that a root cause of the loss of Columbia was the lack of priority awarded human spaceflight by the White House and Congress. There is no technocratic imperative. The technocrats have repeatedly failed by their own measure. And, in the relative scale of public priorities, hardly anyone really cares. The technocratic road to space is permanently closed.

In For The Long Haul

Even as space technocrats dug their own graves, several generations of entrepreneurial attempts to open space also failed. The first rounds failed through utter ignorance of business: founded by engineers who had worked their lives in the technocratic environment, where command, not demand, determines funding, they had no clue how to transform their rocket designs into products that people wanted at prices they were willing to pay. The current generation, including many veterans of the hypercapitalist internet era, know better. Yet, whether they can meet the price point with their technology remains an open question.

It does not help that the last dinosaurs, those remaining technocrats clinging to scraps of power and dreams of empire, work to crush any small-mammal alternative access to space. From anticompetitive export laws to governmental pre-emption to red-tape mummification, the empire continues to strike back, jeopardizing the future of independent access to space.

The small mammals may succeed this time, but the path ahead of them is one of slow, cautious evolution. A contestant may claim the X Prize soon for quick-turnaround suborbital flight. A small industry of suborbital tourism, "barnstormer" flights up to the black and back, may grow from there. Then, perhaps, a dedicated orbital-tourism destination, a sustained commercial presence in Low Earth Orbit, perhaps a return to the Moon to utilize its resources for cislunar construction, then, when the incremental cost of exploration is sufficiently low, missions to Mars and beyond.

The last age of exploration followed a similar pattern: the polar expeditions were undertaken at relatively negligible cost, using off-the-shelf technology and surplus commercial vessels. Exploration took place after maritime commerce matured to the point where the cost of non-economic voyages could easily be sustained by the overall economy. Exploration is a luxury good, purchased in boom times and sacrificed in lean ones. It is likely, then, that space exploration will have to wait upon a space economic boom.

At the most wildly optimistic projection, space is half a century from that level of development, no matter what may happen with the rest of the human economy. No credible alternative to the evolutionary development of capacity, infrastructure and demand has ever been presented. Thus, absent a "fairy godmother" scenario of magical change, the road back to space will be sustainable, but it will be slow.

The Network Solution

Just as bureaucracy was the means to achieve technocratic ends, the network enterprise is the tool to build a sustainable human presence in space. Information Age scholar Manuel Castells distinguishes between the "bureaucracy" and the "enterprise:" the bureaucracy comes to be concerned primarily with self-perpetuation, with defending its turf and maximizing its budget. The enterprise keeps a focus on its goal, changing its form and methods as needed. The network enterprise, he says, is the linkage of many enterprises to the extent that they share a common, overarching goal. This is the real shape of the organism actually working to get us into space. It is the taxonomy of The Spacefaring Web.

The actual "organization" doing the work of human expansion into space has no articles of incorporation, no membership cards, no government minister at its head, no one "info@" email address. In any NASA center or Big Aerospace firm, any cubicle farm may have non-members and key players sitting cheek-by-jowl.

While there are no shortages of organizations in the Spacefaring Web who regard themselves as coherent, autonomous actors, that perception is diverging from reality on a daily basis. Pickup teams from different institutions – and different sorts of institutions, including universities, think tanks, government research institutes, defense conglomerates, entrepreneurial startups, space advocacy organizations – come together or share information on an ad-hoc basis, and dissolve when their specific goals have been met, leaving behind a network of friendships and alliances which can be reactivated as needed.

The Spacefaring Web may not be the sort of organization that springs readily to mind, but it is real, and effective. Its members are well-acquainted with each other, and no one, including any reader of this essay, is more than two degrees of separation from all the others.

The network enterprise runs on vastly different software from the bureaucracy. The term "hacker ethic" was coined by Essa-Pekka Himmanen to describe the values of the network. Where the value system of the bureaucracy has been called the "Protestant work ethic," requiring *withholding* and *obedience*, the network's value system, growing out that of academia, "consists of melding passion and freedom." Himmanen also adds the core values of "activity" and "caring:" activity meaning the rejection of mere consuming in favor of the satisfaction of producing, and caring in a desire to protect and grow the network. The highest network value is creativity, the use of one's own abilities to create something new and valuable.

Within a bureaucracy, information was transmitted only through a chain of command, up from junior to superior, as orders flowed back down. Withholding kept information within the bounds of effective control. Obedience minimized the danger from games of "telephone" in situations where data and orders needed to be passed from hand to hand along long chains. There were sound information-technology reasons for this system. In the early ages of industrialization, it made sense and was actually effective.

Those days are long past. Corporations outsource, governments privatize, hierarchies flatten as field agents gain decisionmaking authority while decisionmakers get direct access to raw data. Networks work by ensuring that data (like capital, another form of data) flows freely where it can do the most good, enabling maximum freedom and creativity.

The hacker ethic is spreading slowly through the space community, as a pragmatic response to individuals' desires to focus on the goal of spacefaring, rather than the process of turf-defending. A rejection of space as a consumer product follows inevitably from the realization that nobody, no government or infotainment conglomerate, will give it to us - we must get there on our own. Once we choose activity, we find scope for our own individual creative contribution. As our network grows, we see opportunities to involve others, broadening the network and bringing our goals closer to realization.

Revolutionary Patience

With the network, we have the technology. With the hacker ethic, we have the value system. But if the exploration and settlement of Mars is a generation or more away, how do we keep ourselves and the overall enterprise working towards the goal?

Some enthusiasts, brought in by promises, spoken or unspoken, of a golden road to Mars in a few brief years, paced their efforts to a sprint rather than a marathon, and have dropped away in exhaustion. Some lack the motivation to work incrementally towards a distant reward. Some choose to ignore reality and perpetually hunker down in the blocks, waiting for the firing of the starter gun for that sprint always almost ready to be run.

None of these approaches helps us get into space at any speed. To succeed, the space movement, as a movement, as a force for change, must cultivate an attribute that the environmentalist Terry Tempest Williams calls "revolutionary patience," which she defines as “caring enough to explain what is perceived at the time as madness and staying with an idea long enough, being rooted in a place deep enough, and telling the story widely enough to those who will listen, until it is recognized as wisdom.”

Revolutionary patience is the approach required by the conclusions of The Spacefaring Web: we're not going to space any time soon; governments won't get us there; and so, the only way we'll go is through our own networked efforts to build, incrementally and sustainably, a spacefaring civilization.

The methods of the Industrial Age are unsuited to networked organization and revolutionary patience: rallying the rank and file for the big push was a staple of 20th Century industrial and military management. Without a big push, with a steady development of critical elements, a different means of motivation is needed.

For the scientists among us, as opposed to the engineers, revolutionary patience may be second nature. After all, this is how science is done: independently, with freely shared results, bit by bit building and revising a progressively more sophisticated body of knowledge. The hacker ethic is very similar, bridging some of the gaps between academia and commerce with its focus on developing and refining products, rather than ideas.

For most of the rest of us, conditioned to the short-term cycles of business and the instant-gratification expectations of popular culture, the development of revolutionary patience may be an immense challenge. The key for personal participation as well as for the overall enterprise is sustainability. The question for each of us is not “what can I contribute today?” but “what can I contribute across a lifetime?” The answers may be quite different. We might have, and need, the time to study, to train, to practice; or we might conclude that our best sustained contribution may take a different form that what we would give to one great push.

We need to ask ourselves what contribution we can keep making, year in and year out, that we will find rewarding, regardless of the distance of the goal. We need to be around for the long haul, not just to see it through, but to provide leadership, continuity, training and wisdom. Only if we can demonstrate revolutionary patience in our own efforts will we be able to call it forth in others.

As Below, So Above

By practicing revolutionary patience, we'll come to find that we'll be in the company of the same people for a very long time. Tolerance is certainly valuable in a small community of intensely dedicated people. As with most things of value, it is also often in short supply. So, as we build our own networks within the Spacefaring Web, we should ask whether the people around us are the right ones with whom to spend a lifetime building a spacefaring civilization.

The question has two components - can we work with particular people across a lifetime of commitment, and are those people the ones to shape the sort of network - and eventually, civilization - that we want to see?

To help answer both questions, there's one good tool. Magical belief systems hold that "as above, so below:" that events in the heavens and the behaviors of supernatural forces shape our relations here on Earth. The magic of the Spacefaring Web is based on the notion, "as below, so above:" the way we live our lives here inevitably shapes the sort of civilization we would build in space. A more cynical variation is, "garbage in, garbage out."

There's a widely expressed view that "it doesn't matter how we get there, simply that we get there." Nothing could be farther from the truth. What we will build in space will be entirely the product of who goes and by what means. Environmentalists will build a civilization where Mars is respected. Military space advocates will build a civilization where American power and values are extended to its space colonies. Hackers will build a cooperative culture; governmental engineers likely will not.

"As below, so above," is also a guideline for the problems raised by revolutionary patience. If you want to build an ecologically friendly settlement on Mars, strive to live that way on Earth. If political freedom is a value you wish enshrined in space, work for it right here and now. If you want a spacefaring civilization that respects the arts, bring your art to the space community now. By doing so, you hone your skills, becoming more useful to the space enterprise.

You also develop a certain credibility. Actions speak louder than words. The allies we choose, the projects we pursue - these define the future we would build, regardless of our intentions or proclamations to the contrary.

Lithosphere and Noosphere

Mars may be the capital of The Spacefaring Web. The Red Planet, much more than the Moon or Low Earth Orbit, is not the sole fiefdom of NASA, or of the scientific community. It is more than a programmatic objective or object of study. All of us claim an easement over its meaning, an interest in its future, and veto power over its development.

Mars is no neutral object of geological study, like Ceres, or even Europa with its prospect of life. Mars *means* and Mars *matters*. Mars is not just the lithosphere of its fascinating geology; it is wrapped as well in the noosphere of mind, subject as much to the forces of passion as to the tools of reason.

The imaginative Mars is a product of our own opinions on environmental ethics, be they informed or reflexive. It is a product of the cultural consensus on the value of exploration and the frontier, of raw nature, of risk. This consensus is a powerful force whose shifts can be tracked, but are little understood and poorly susceptible to conscious manipulation.

To the quantitative scientist, all this may seem hopelessly nebulous, and thus to be excluded from consideration as not the sort of data to which validity or utility is accorded. The Spacefaring Web has been an attempt, if not to reconcile the physical and the imaginative, at least to translate between the two.

Perhaps the physical reminder of Mars bright in the night sky explains the concentration of Mars-themed issues in the summers of 2001 and 2003. I believe that it may, which is why I've chosen to end this compilation with a commemoration of the 2003 Mars Opposition, **3.16, The Gravity of History**. This final entry echoes a fundamental theme of the Mars essays, stated in **1.4 Mars Attacks!** - "Mars is its own place, yet Mars is a place of our creation."

If there is, as philosopher Ken Wilber puts it, a "Marriage of Sense and Soul," a unity of science, art and spirituality, then Mars is its community property. If this compilation has one theme, it is the hope that by acknowledging our joint claims, we can share our Marses in exploration, rather than abandon in a bitter cultural divorce the Mars of science and the Mars of hope.

The Spacefaring Web
1.02 Queen Elizabeth's Hab
July 14, 2001

"Opportunity, not necessity, is the mother of invention," says urban planning philosopher Jane Jacobs. This epigram should be tattooed onto every garage inventor, technological utopianist – and space advocate. For decades, we've been discussing the virtues of the High Frontier and making the case for Mars, but a genuine calculation of opportunity has yet to be convincingly made. There are profound reasons why we don't have cheap access to space and settlements on Mars. If we don't understand those reasons, we'll never overcome them. As in so many things Martian, there's an Arctic analog to our shortcomings in space.

We know that for many centuries, the New World was just barely within the technological reach of northern Europeans, and that the Norse established settlements there. But at the dawn of the modern Age of Exploration in the late 15th century, Europeans had vastly less knowledge of that new world than we do of Mars. Following up on legend and rumor, John Cabot discovered "New Found Land" in 1497. Cabot was on the very bleeding edge of exploration technology: when a recreation of his ship sailed on the 500th anniversary of his voyage, replete with added modern conveniences, the crew found conditions and handling unendurable. Today no lands and titles await a transatlantic sailor, and we would demand a steady deck, a warm, dry cabin and vermin-free food as necessities. But opportunity – in the form of royal rewards for imperial expansion – made the cramped, unhealthful, dangerous trip worthwhile.

A lifetime after Cabot, in 1576, Martin Frobisher returned from a search for the Northwest Passage to China with a black stone. Various members of the Queen's court had the stone assayed until one opportunist whispered the word they most wanted to hear – gold! A speculative frenzy of expedition finance and industrial development – refineries for the tons of gold sure to return – began. Frobisher's next expedition was vastly different: rather than trade goods and ambassadors for China, he brought with him England's best guess at settlement technology. He was charged with building a mining camp at the ore's site near the south end of Baffin Island.

Frobisher was a type we find again and again in the history of private exploration: a monomaniac, with a fanatic's belief in his goal coupled with a narcissist's incapacity for self-doubt, and the fire and bluster to subdue raw Nature herself. Yet even the ruthless Frobisher, at the end of the brief Arctic summer, knew that the would-be settlement, though possible to establish, was unsustainable. After the following season, when no gold was found in the tons of ore, the site was abandoned. And while the European-descended population of the New World exceeds half a billion, to this day the closest thing to Frobisher's descendants in the Canadian Arctic are the summer scientists of NASA's Haughton Mars Project.

There are several lessons in Frobisher's failure. First, that inadequate technology can in fact be pushed to spectacular extremes. Elizabethan ships were not designed for transatlantic crossings, but they could make it, given reason enough to risk the attempt. Correspondingly, we can get to Mars by pushing current technology. Those who claim we "need" deep space cyclers, nuclear-

thermal or VASIMIR rockets, forget the dictum I began with: opportunity, not need, defines the possible.

Second, sustainable settlement is a different beast entirely from exploration. At their very best, the technologies of exploration and settlement are much the same, requiring a minimum of external inputs. Inefficiencies are much more tolerable in the short term, of course, so an import-dependent team might survive through an expedition lasting a year or three, but would be doomed over a generation. To ensure the success of an expedition, we build in redundancy. For a settlement to prosper, we design in flexibility.

It follows that an aversion to risk is a crippling obstacle to settlement. At least as great as risk of failure is risk of cultural change – the death of a way of life. Frobisher sailed before England became a great power, before it had a reputation to maintain. Elizabeth and her kingdom were upstarts, willing to risk much to become a great power. She was willing to see Frobisher staked a fortune that he would lose when the ore was found to be worthless. Centuries later, Victoria's Franklin expedition faced a much different calculus: the nation had great-power status to maintain, and risking failure from a shortage of resources or an excess of social tinkering – such as adapting the behaviors and technologies of the indigenous culture – was not possible.

Since America has been a great power, the same constraints have applied. Our way of warfare has us burying opponents under materiel and the highest of technology: procurement, not strategy, is fundamental. That same approach carried over to the Pentagon's little sibling, NASA. When the 1989 Space Exploration Initiative fixed a price tag of half a trillion dollars on a mission to Mars, it was following the mindset of a government that needed 16 aircraft carrier battle groups to cover the globe against any possible threat. The risk of damage to reputation had to be reduced as close to zero as money could buy. Efficiency and opportunity were irrelevant.

So why aren't Americans on Mars? For the same reason we no longer have 16 carrier battle groups: at this blessed moment in history we can have our empire without paying for it. There are no lean and hungry challengers around today. And why haven't we been beaten to Mars by upstarts willing to dare risk in the name of opportunity? Because neither element – risk or opportunity – has been adequately quantified. Over time, this column will attempt inroads on both.

Frobisher failed to settle the Arctic because he lacked even the most basic accurate data about the risks and opportunities. The Arctic winter was an unknown; the black rock not recognized for worthless hornblende; the peas planted in the Arctic regolith couldn't possibly grow; and in every human factor issue from housing to diet to toolmaking, he was unprepared for the environment. He'd rushed in, blind to the unknowns, contemptuous of environmental factors, counting on will to triumph over adversity. Three hundred years would pass before Frobisher's landfall would be visited by a non-indigene: Charles Francis Hall, who meticulously studied and adapted to local conditions, presaging the successful polar explorers – from backgrounds public or private other than those of status-quo powers – who chose flexibility over iron demonstrations of will.

Mars mission planners take note.

The Spacefaring Web
1.03 From Viking to Vegas
July 27, 2001

If we succeed in becoming a spacefaring civilization, likely July 20 (along with April 12, Yuri's Night, maybe the most brilliant meme in a generation) will be a universal holiday. The anniversary of both Apollo 11, the first human landing on another celestial body, and Viking 1, the first robotic landing on another planet, the day marks our first pair of baby steps into the cosmos. Anniversaries are backward-looking things, though, and this column was going to do just that – look back at the influence of the Viking missions on two generations. But a funny thing happened while I was researching the piece. Obliquely, and in very strange circumstances, I discovered that a dynamic spacefaring future just might be at hand.

If you have to go to a space conference, try to pick one in Las Vegas. While the comparison of that self-contained, immensely artificial town to a space settlement is a facile one, there's in fact an immense richness to it. There have been a few moments in life when I've felt an immense pride in being human: on seeing Michelangelo's Pieta, on downloading the first Mars Pathfinder photos onto my laptop – and on this trip, driving past Hoover Dam and then down the Strip, both for the first time. We're lotus flowers, we humans, born in the muck, rising in beauty to the heavens. Vegas is the jewel of the lotus, founded in corruption, but brash, bold, beautiful, glorious fun.

The spirit of the place deeply infected the attendees at the Space Frontier Foundation's Return to the Moon III conference. The second half of the weekend was an experimental workshop in designing a near-term lunar settlement: attendees and panelists joined on specialist teams focused on finance, transportation, habitation, policy and science, then cross-fertilized. They worked in a room right around the corner from the welterweight boxing championship weigh-in at Caesar's Palace (George Foreman went away with a stack of "Return to the Moon – This Time We Stay!" posters for his inner-city youth gyms). These scientists and academics and government employees suddenly began to channel the shade of Bugsy Siegel: this moonbase – it's gotta be gorgeous! And give the people what they want! And make huge profits to finance growth!

Rather than the expected "take lots of taxpayer money to put scientists in a can" – the sort of sterile technological "mule" I've condemned before – the conference instead became the outline of what I'll call the Spacefaring Web, the organically-developed, integrated technologies and institutions we'll need to become a spacefaring civilization. These folks really got it, turning quickly to entertainment as the only conceivable justification for spending – and source of – the kind of money needed to build on the Moon.

But the great big lightbulb went off not in session but after hours, of course, at the bar. Four of us were sitting at dinner. I was deep in conversation with a friend who'd been to the Viking retrospective the day before in Washington, when I looked up to see one of us really engaged in discussing the conference program – with a Klingon. We were in Quark's Bar at the Hilton. The next flash came from my fiancee and the session's policy chair: hey, this is the dream, isn't it?

Sitting with good friends in a space station bar, talking with aliens about our plans to settle a new world… July 1969 gave me my first Moon landing, my first Star Trek episode and my first Heinlein novel, all within a couple weeks. And here I was in 2001, (sort of) living the dream.

Then an even bigger flash: hey, right now, literally billions of dollars are being made off that dream! It's not just a bare hundred geeks and freaks in a hotel baying at the Moon – this dream is popular, and lucrative. So if we take the existing and successful Vegas dream machinery and make it cooler and realer – Quark's with a panoramic Earth view – well, that's the Spacefaring Web right there!

But what does this have to do with Mars?

Last week we looked at examples from the previous European ages of exploration, in the 16th and 19th centuries. Very briefly, the earlier missions succeeded in reaching the Arctic, as their technology was just barely capable of a "flags and footprints" mission, but the Europeans lacked the financial and technological resources to back a sustained presence. Our spacefaring efforts are at that Elizabethan level: we can get to destinations in the inner solar system with some hardship and at great cost. We can: we went to the Moon, and something like Mars Direct could give us a toehold on the red planet. But a McMurdo Station, let alone a Jamestown Colony, are not attainable by the means we've used so far.

Sustaining *any* innovation – from the wheel to agriculture to a Mars settlement – requires not single-point effort but a sustaining web of technology and institutions. A quick example: the Egyptian pyramids were built using single-point efforts. Finance, labor mobilization and technology were developed uniquely for that task and were not broadly rooted in the Egyptian civilization. Millenia later, people still advance bizarre theories of the pyramids' origin, because they're anomalous, not embedded in a context. This is precisely why people believe that the moon landings were a hoax: they were similarly an anomaly. Nobody believes that the Gothic cathedrals, every bit as amazing as the Pyramids, were created by space aliens. We can see how they were rooted in the guild systems' retention and transmission of technical knowledge and training, in the wealth of the Church and the dispersion of new design principles and construction techniques across Europe. Similarly, nobody believes the new biotechnologies to be fiction – they're obviously embedded in a familiar context of global medical science, finance and industry.

So how do we get to Mars to stay? It's very simple: stop building pyramids and start building the modern equivalent of cathedrals: Las Vegas resort hotels. All our efforts in space to date, from the postwar V-2 experiments to the International Space Station, have been pyramids. Single-point commands were issued by the sovereign: "Build this thing. Just go and take what you need. Do whatever it takes – short of weakening the sovereign – and make it happen." Las Vegas, on the other hand, took existing resources: cheap power and transportation, air conditioning technology, a sophisticated and unprejudiced understanding of how people like to spend their surplus time and money, and synthesized them into something unlikely and new: an immensely popular vacation resort in the middle of what's no longer nowhere.

There are flaws in the analogy between Vegas and space. Notably, we don't have the transportation infrastructure. Las Vegas needed affordable passenger air travel and the cheap, reliable trucking enabled by the then-new interstate highway system. Cheap access to space is critical for anything we want to do beyond ISS-pyramid building.

But there are nodes of the Spacefaring Web that can be built and integrated readily: suborbital passenger and freight transportation, "extreme" orbital tourism (as opposed to vacationing, which is a later step). These things can readily enable larger facilities within the Earth-Moon system, which in turn will provide the robust infrastructure necessary to launch and sustain a Mars settlement effort. As 19th century polar exploration simply refitted existing commercial and naval vessels and was enabled by global maritime trading networks, it's entirely likely that the Martian *Mayflower* will be a refitted Luna-to-LEO freighter carrying proven habitation modules, food production technologies and tried-and-true spacesuits and tools. That ship and that crew will be able to build a Martian civilization to endure – financed maybe by pay-per-view Lunar boxing and laundered credits from the Moondust Casino.

It's not our fathers' space program. Viking 1 was a majestic, immensely useful, near-solitary pyramid in an empty desert. With a new approach, we can build to sustain, to thrive and prosper, filling that desert with our cities. To paraphrase George Foreman's new poster, this time we stay.

The Spacefaring Web
1.04 Mars Attacks!
August 5, 2001

Mars is its own place, yet Mars is a place of our creation. For over a century we've struggled over visions of what Mars is: generations have had their own fiery controversies, from the existence or nature of the canals to the meaning of the Viking life detection results to the nature of the microstructures in the ALH 84001 meteorite. But more was and is at stake than in most scientific disputes over ambiguous data, as Mars has always been more laden with meaning.

We – scientists, artists and laypeople alike – have created oft-competing Marses of the mind, shaped by our understanding of the available data and shaping our hopes, fears and desires. The best of us explore in both Marses of science and imagination, always learning while working to shape the human-influenced Mars of our heart's desire. The struggle among these mental Marses sharpens our advocacy and our understanding.

Even with two visions of Mars that challenge the legitimacy of everything we hold good and true – call them the X-Mars of the conspiracy theorists and the Mars Attacks! of those afraid of biological contamination or experimentation – provide us with opportunities to better our own efforts – or to show us up as just the sort of arrogant, manipulative elitists these believers would have us be. The outcome of our confrontations with them is ours to shape.

Mars Attacks! is the microbial stepchild of Orson Welles's famous 1938 broadcast of "The War of the Worlds." That radio drama mistaken for news caught a populace primed with the science fiction tales of Buck Rogers and Barsoom, popular-science articles about space travel, post-Lowellian life on Mars and the great cataclysm of the Second World War just beginning in Europe. Fear of invasion, from Germany or outer space, was ready to be sparked.

Likewise, now, each month sees the growth of an anti-technology protest movement directed in part against the life sciences. Fears of epidemics like AIDS or the Ebola virus are latent. Conspiracy theorists win adherents to the notions that NASA never went to the Moon and is concealing evidence of Martian civilization. Drop a sample-return mission or a human expedition finding evidence of life into the mix, and the grim scenarios of two recent Mars novels could well become reality.

Robert Zubrin's novel *First Landing* (to be discussed more thoroughly in a future column) posits a cynically manipulated mass hysteria that nearly forces the stranding of a crew to allay fears of microbial Martian monsters, while Paul McAuley's *The Secret of Life* explores high-level scientific politics in response to the release of engineered organisms containing newly-discovered Martian genetic material. Both address seriously issues becoming ripe: the intersection of astrobiological research and anti-biotech protest.

The potential exists for a movement that would put a stop to Mars astrobiology in order to preserve us from corporate- or government- sponsored environmental threats. Put bluntly, people are scared of bugs, don't understand science and don't trust scientists, politicians or

corporations. If those mistrusts and fears explode, they could hinder or stop the exploration of Mars.

So the question becomes one of the nature of our response to this apparent threat. Unlike the debate between mainstreamers versus revisionists on the Viking life-detection data, or between "red" versus "green" visions of a human Mars, many advocates of X-Mars and Mars Attacks! reject the civil and rationalist terms of the debate, citing faith, emotion, or secret knowledge. They'd knock over our sandbox rather than simply trying to steal our shovel.

Some of us believe, along with political philosopher Thomas Hobbes, that refusal to play by the rules forfeits the protection of those rules, and the gloves come off. As a theory of criminal justice, that's got a bit to recommend it, and the turning of the tables in Zubrin's novel is quite emotionally satisfying. Yet I believe that such an approach with respect to any opponents of a rational search for life on Mars is tactically unsound, unnecessary, and probably flat wrong.

Any irrational, absolutist opposition to the search for Martian life, rather than being necessarily a precursor to something like the Khmer Rouge's shooting of anybody literate, actually does the astrobiology and space advocacy communities a service. Several years ago novelist Kim Stanley Robinson warned a Mars Society audience of what he called "the narcissism of petty differences:" our tendency to expend more time and energy fighting against our comrades-in-arms over minutiae than in expanding our numbers or our public effectiveness. Advocates of the economic freedoms loosely known as "globalization" are just awakening to the fact that protesters are forcing them to articulate clearly the advantages of their agenda, and to improve their arguments through competition in an ideological marketplace. The same can hold true for advocates of scientific research into possible Martian life. We can seize the opportunity to do something scientists rarely do: explain their work to laypeople and convince them of its value.

Demagogues can only sell what people want to buy. In the decade past, Americans were buying, and rabble-rousers of all political persuasions were popular. These days, they've almost all faded away. Market conditions have changed. Any attempt to provoke the latent fears of Martian life may face an uphill struggle.

Similarly, any attempts at counter-demagogery by the Mars community are likely to be ineffectual and resented. We can be manipulated, but we tend to resent the hell out of the people who do so: hence, the unpopularity of used car salesmen, lawyers and politicians. Acting like used car salesmen to advance our agenda will only earn us deserved contempt.

On the other hand, while we are ignorant and mistrusting, we're practical-minded. Anyone who can make the case that reason is good and useful (and a better product than fear and paranoia), and that the search for life on Mars is reasonable, good and useful, can do much to prevent a "War of the Worlds" panic or Seattle riots at JSC.

There's much to be done, and I'll be revisiting this issue regularly. A few first steps are being taken. This month, a group called Greens4Mars will be hosting a panel discussion at the Mars Society conference. The Space Frontier Foundation has been actively reaching out to the environmental community, thanks to a NASA grant in support of space solar power research and

education. Its annual conference this October will feature SETI pioneer Frank Drake and a focus on contact with extraterrestrial life. For a few years I've been discussing the possibility of an environmental and space advocate's roundtable. It's premature, as the communities have precious few ties right now. But there's much we can do to reach out to people and groups with both legitimate concerns and irrational fears, to begin a discussion. If we can't convince people that astrobiology and its advocates aren't dangerous and crazy, we'll get what we deserve.

The Spacefaring Web
1.05 "Why Mars?"
August 12, 2001

Why Mars? It's the inevitable question most people ask when confronted by our interest and involvement in the exotic red planet. It's not so much why Mars, as it is why be interested in a thing beyond the immediate and everyday. I faced the same bafflement while in graduate school for Russian studies: why the exotic, the alien, the seemingly impractical? The difference now is in the next questions asked by co-workers at the water cooler, which are usually one or both of "why waste all that money in space when we have problems here on Earth," or "how dare we go screw up another planet while we're treating this one so badly," a somewhat different question.

These questions are fine, and appropriate – they go to my personal motivations and deserve a well-considered answer (in passing, my favorite reply to the first one is on pp. 21–22 of Buzz Aldrin and John Barnes's novel *The Return*). They open the door to challenging several of our culture's unquestioned assumptions, and if handled with respect, get people thinking.

There's a different and more troublesome "why," though – not the why that's asked but the why we feel impelled to answer just precisely so in order to garner the resources necessary to go to Mars. There are two ready dangers in that why: misconstruing whom we must satisfy with our response, and using competing answers to feed factionalism among Mars advocates. Mars, I believe, is very like Everest: "because it's there" really is sufficient.

In my public talks, I don't start by addressing the water-cooler whys, for an important reason. I stress what people are doing now to get us to Mars, from the FMARS research station to people inquiring into the origins of life, solving the puzzles of photo-geology, building launch vehicle companies or advancing recycling technology. I explain how affordable it can be and compare the costs not to government programs but to what we spend on smokes, booze and makeup. By the time I open things up for questions I'm not alone in answering those doubting whys: I've got an audience half-full of people ready to supply their own reasons.

The "imperative" answer to why ("The reason why we should want to go to Mars is – ") doesn't address *your* motivations when you answer me. It addresses my motivations. It doesn't explain what passion animates your efforts, but imposes or denies a stamp of legitimacy to mine. When you tell me, "Mars is the manifest destiny of a pioneering people:" then my desire to live as part of nature rather than master over it is illegitimate. When you declaim "Mars will demonstrate the virtues of small-scale socialism," then I hear that my fellow advocates of using free-market tools to spread rapidly through the solar system may not be allowed to act on their views. Declaring that "Mars should be an off-limits park to preserve indigenous life, if any" may condemn humanity to an increased threat of extinction from being denied a potentially livable world.

All these "this and not that" arguments divert our energies away from getting to Mars and towards fighting our only allies. They doom all our visions of Mars by denying any one a consensus powerful enough to succeed. The "explanatory" why, by contrast, ("I want to go to

Mars because – ") invites the discovery of common ground, the expansion of possibility, the magnification of support.

That's my why, and that's my Mars. This great endeavor – the settlement of another world – speaks to so many of us, personally, uniquely. I want a Mars full of people answering their own calling, not selected, sifted, regimented, commanded. That's why I find the other why, the imperative why, so dangerous. It legitimizes a single view and casts the others as wrong, unwelcome, excluded. Mars must not fall victim to the evil utopian fallacies of the last century, when idealists – bloody dictators – sought to create one static perfect society, a thing which can only be done by the exile or slaughter of the misfit, by using the tools of state power – guns and jails – to pound the round pegs of human complexity into the square holes of ideology.

I note that my explanatory why, if it were an imperative why, would exclude people too: it doesn't allow room for those who *would* use guns and jails, who would impose immigration controls, who would force their vision on others. Rather than tossing off a glib answer, I'll expand on the reasoning behind it, involving a fairly heavy dollop of modern political theory, in a later column.

Beyond utopianism, the imperative why is an outgrowth of the governmental monopoly on access to space. Advocates of space projects have always been forced to play zero-sum games. Government budgets are finite, and choosing one expenditure means rejecting another. Increases in the NASA budget come out of Veterans Affairs or Housing and Urban Development. Money for Mars means less for the International Space Station. To fill my rice bowl, I must steal from yours.

Demand, rather than command, economies work differently: to gain support for my project I don't have to convince the sovereign that some other project ought to get bumped. Rather, I just need to find people who share my passion and have the resources, be they cash or sweat equity, to realize my goal. I choose to spend my money on books rather than movies, supporting a publishing industry. Enough others choose movies to keep Hollywood busy.

By private means, going to Mars doesn't negate going to the Moon. Nor need one vision of Mars invalidate another. Some will fail to attract adherents, some will fail in the harsh conditions of Martian reality. Some will scrape by like old mining towns; some will flourish like Las Vegas. The determinants will be physical conditions and individual choices, rather than the commands of prophets or sovereigns.

Try, the next time someone asks "why Mars," to answer by naming *your* passion, not delimiting theirs. This applies most strongly to those of us in the space advocacy community. By definition, we like to assert our views – that's what makes us advocates. Yet when we're not preaching to the choir we're hunting heretics in the congregation. How many of us have pitched donors for support, only to be told that they don't want to get involved in inter-group rivalries? A robust internal debate strengthens us. But if we work together on the 90% of issues where we share common ground, we can continue to debate the 10%… in Luna City, O'Neill One and Dorsa Brevia, rather than endlessly in Boulder and Los Angeles.

On the eve of the fourth annual Mars Society conference, I'd like to encourage each speaker there to approach the question of "why" as introspective rather than imperative. Share your passion with us and encourage our participation. Recognize that Mars is world enough for a multitude of dreams.

MarsNow 1.06
Organizing For Mars
August 19, 2001

What institution is best (or most likely) to get us to Mars? Many of us hold strong views on this subject. Some argue for sovereign nation-states (or groups thereof), some for the giant military-industrial aerospace corporations (or consortia of them). There may be a better answer: the loose technological and financial network I call the Spacefaring Web. To get to that answer, we need to ask the right question: not how we can get to Mars with the tools of the past, but rather, how should we best organize our resources - labor, capital and knowledge - to get to Mars now?

Let's start with a look at corporations. The formation of the corporation as we know it today was occasioned in part by new technological and financial needs in the 18th Century. Until then, major enterprises were financed either by loans or grants from the sovereign, or by secured commercial loans. The corporation had one critical new attribute that made major new projects possible: limited liability. In case a corporate venture failed, the organizers were required to pay back investors only up to the amount of funds left in the corporation, rather than everything the organizers owned. For example, if a ship bearing silks and spices sank, investors who had provided money to the enterprise to be paid back from goods sold could only be paid back the amount of money still invested in the venture - and couldn't seize the house and property of the company president to pay the debt. This made being company president a lot more attractive….

The corporation was seen as having other attributes as well. Corporations are regarded as legal "persons" having some relatively constant identity. One of the distinctions between a corporation and a partnership (the form of venture most common before corporations were created) is that a corporation has existence apart from the humans composing it. Technically, a partnership dissolves every time a partner quits, and is re-formed as a new entity when a new partner comes on. A corporation, however, is like a human - regarded as maintaining a fixed identity despite the birth or death of any particular cells - and is recognized by law as having the ability to exist in perpetuity. In previous eras, this provided needed stability, as finance shifted its focus from one-shot trading missions to ongoing projects like running a railroad.

The world has changed, and a static nature is now a business liability. The corporation as immortal person makes little sense. Almost no corporation has lived much more than a century. The Hudson's Bay Company is a near unique exception, and it has transformed from a virtual nation in the 18th Century into a modern Canadian department store. Corporations no longer look much at all like their predecessors: stable entities in one business for generations, be it running a railroad, mining coal, smelting steel. They acquire and divest lines of business with abandon, as technologies and market needs change. Microsoft isn't in the same lines of business as it was at its founding, let alone IBM or AT&T. Obviously, the latter have few if any of their original employees.

So the corporation evolved to meet the needs of an industrializing, stable financial world that is long gone. It is no longer be the most suitable vehicle for extremely large, technologically innovative, economic activity. Scale and innovation now demand flexibility rather than stability

and the lateral, rather than hierarchical, flow of information, a fundamental change from the static, "monolithic individual" modes of the past.

Scale and innovation are the hallmarks of the exploration and settlement of Mars. Yet our institutional kit is largely limited to two tools designed to solve the resource-marshalling problems of two centuries ago, the nation-state and the giant corporation, which are ill-designed for building Martian settlement. I'm focusing on justifying that statement with respect to the corporation only in this essay, to keep it to a reasonable length. Let's just say that the only good argument in favor of the nation-state is that it has a near-unlimited ability to extort financial resources in the form of taxes - which is a very different thing from being able to manage those resources efficiently, wisely, well - or at all.

With respect to an endeavor as large as the settlement of Mars, we should ask not how we can use the tools we have to solve the problem, but rather, what tools we would want to have.

How should we organize our resources to get to Mars to stay? There was a marvelous paper presented at one of the early Case For Mars conferences that demonstrated that the Romans could have settled the New World with imperial resources and the oared vessels of the time, but it would have been insanely expensive and awkward. Sustainable settlement waited on the technological and financial tools to do the job in a reasonable way. Sure, it's *possible* to get to Mars with the Western defense-industrial complex in charge, but getting to Mars won't be *practicable* until appropriate new tools are at hand.

What *would* work best? What I call the Spacefaring Web: a loose network of specialists, including space advocacy groups, entrepreneurs, university research teams – and elements of dinosaur industry and government that can still keep up with the small mammals scurrying underfoot. Central control is not evidently necessary, and certainly not necessary to any great degree.

To the extent there are certain optimal solutions to the problem of getting to Mars, anyone attempting to do so will discover those solutions and cooperate for reasons of efficiency with others who also have found them. Specialists will come and go as need for their expertise arises and ends.

For example, the launch vehicle designers busy in year one will not be involved in year 15, nor will the city builders have much to do until then. Central control adds layers of management, delays implementation, increases costs and waste. This doesn't mean abandoning oversight: auditing specialists could certainly be part of the network, and nodes (firms, individuals, nonprofits) identified as wasteful or corrupt would be shunned by other nodes seeking optimal arrangements.

So how does the Spacefaring Web get built? Creating a network involves building both nodes and interconnections. More nodes come from the creation of able startup businesses, research institutes, space advocacy projects or chapters, and individual action. Interconnections are built through cooperation.

Two things don't work: sitting back and waiting for NASA and its prime contractors, and parochial infighting. We must both create and lead our own focused teams, and cooperate with others to a common end. The Spacefaring Web is built from right here, right now, with today's projects and investments, outward to a robust space infrastructure and onward to Mars and beyond.

MarsNow 1.07
Hostages to Politics
August 29, 2001

Robert Zubrin's recently-released novel, *First Landing*, inadvertently makes a powerful case *against* a near-term NASA mission to Mars. The policy implications of his scenario couldn't be clearer: a governmental Mars mission will, from development through crew return, be hostage to the shifting whims of the American electorate, the media and interest-group politics. To any follower of the nearly 20-year odyssey of the space station from Reagan's speech to the recent 3-crewmember scaleback., this will hardly come as a surprise. Yet some have held the faith that a Mars program will somehow be exempt from the laws of money, politics and human nature. *First Landing* shows us, through a harrowing application of those laws, just how any government-dependent Mars mission will be a hostage to politics.

First Landing's premise is that the discovery of microbial life on Mars by the first crew touches off a mass hysteria, with talk-show demagogues fueling existing fears of biotechnology and epidemics, leading to Seattle-style riots at JSC. A craven Administration bows to the protesters and tries to strand the crew, to prevent a feared back contamination of Earth. The JSC riot scene struck a nerve, as I read it the week of yet another anti-globalization, anti-biotech riot. Zubrin's scenario is a distinctly possible one: there are plenty of scaremongers in the planetary science and environmentalist communities, as well as the usual run of media opportunist, ready to tap into the fears built up from AIDS, cloning, GMOs and the like. Given the media attention that these groups would receive on the discovery of Martian life, a genuine mass hysteria is not at all impossible.

Yet street riots are merely the far end of a spectrum of problems that are inevitable for a project dependent wholly, or mostly, upon the government. Government support is inherently capricious, and the expense of continuously ensuring that support increases the costs of any project severalfold, at least. This capriciousness is fundamental to the operations of any democratic government that can direct the expenditures of large sums of money. As Freidrich Hayek put it in *Law, Legislation and Liberty, v.3: The Political Order of a Free People,* p.99:

> It simply cannot confine itself to serving the agreed views of the majority of the electorate. It will be forced to bring together and keep together a majority by satisfying the demands of a multitude of special interests, each of which will consent to the special benefits granted to other groups only at the price of their own special interests being equally considered.

This means that for any project to succeed, constant payoffs to other interests are required. These payoffs can take the form of unrelated expenditures, like the shocking level of funding in the NASA budget for local science centers, planetariums and the like in key congressional districts, or they may be built into the project cost directly, through contract prices that bear no relation to market prices (the classic $700 toilet seat), or through dispersing production nationwide to maximize political support rather than production efficiency.

Thus, any project must command enough political support not only to pay for its actual costs, but the costs of constant bribes to every interest group equally or more powerful. Bear in mind that political funding, unlike market funding, is a zero-sum game: given some limits on increases to the national debt, money for any project can only come out of the funding of others. So some sort of payoff to compensate the politicians who might lose the support of the less-favored projects is necessary.

Should the project fail to maintain enough support in attracting budgetary funds and in neutralizing other special interests, it likely won't be cancelled outright, as that would end whatever patronage and influence that the project still had, upsetting its remaining supporters. Rather, it will be allowed to strangle itself on those very inefficiencies mandated by the political process.

There are countless examples of this in military procurement. One classic case is the B-1 bomber. Built for a Cold War mission, the development of stealth technology and end of the Cold War rendered it obsolete on deployment. Its supporters failed in acquiring and maintaining the funds necessary to refit it for actual operational missions (which continued to be undertaken by the 30 year older B-52). Rather than being cancelled – as it did have enough support to dodge that bullet – it was built in numbers too small to be useful operationally, but enough to ensure that some money went to its contractors. The few planes were split up among three bases – militarily pointless, but providing much-prized Air National Guard jobs in key districts.

The ISS has followed a very similar path. Its rationale has changed several times since its initiation as Space Station Freedom in the Reagan Administration. Its political purpose (as opposed to scientific or technological justification) was to ensure a flow of taxpayer money into NASA and out to politically important contractors, without becoming a lightning rod for public opposition. In failing to maintain sufficient political support, it has been reduced to a crew of three: unable to do the research that was its scientific justification, but perfectly able to maintain its own existence for its own sake. In that respect, it has been the perfect government project: freely spending money to provide jobs and benefits, serving no end but patronage itself, and virtually invisible to potential critics.

This is one of the reasons why NASA has never had a humans-to-Mars program: it *could* incite the sort of opposition that Zubrin describes. Vocal opposition, which need not come from great numbers of critics, just voluble ones (witness the several dozen protesters who almost brought down NASA's Cassini mission), means that the gravy train will need a much stronger engine than that required for business-as-usual projects like roads, bridges or the ISS.

Absent overriding Cold War concerns of security or prestige, the strictly political costs of going to Mars will always outweigh the strictly political benefits. To Congress, projects are only important to the extent that they provide political benefits by paying off or pleasing special interests. Extrinsic, non-political, values are not their job. Congress must be indifferent to other values: its job is the dispensing of monetary benefits to special interests and not anything else. It is in the business of politics, and only political concerns will figure. If the political benefits do not outweigh the political costs, it will not be supported by Congress.

I have long maintained that an Apollo-style Mars program is impossible, as the political math simply cannot add up to a positive answer. No high-profile, expensive governmental project with a potential for vocal opposition has succeeded since the era of Apollo and Vietnam, and none will. Americans have become too sophisticated about politics since the Kennedy-Johnson days when there was still some moral authority outside the horse-trading process on which politicians could call..

Should by some fluke a Mars program would actually come into being and survive the political process long enough to launch a mission, it would find itself the victim of the ghastly political viciousness Zubrin describes. In later columns I'll look at the current opposition to Mars sample return and human missions, but for now we'll just say that that opposition does exist, and many of its advocates would have no qualms in stranding or killing a crew over even the most tenuous justifications for fears of back contamination.

There are only two solutions to the political dilemma. One is to wish for a change in the political math. This could happen by a return to deference to political leadership, a return to respect for elected officials. That is a cornerstone of the Zubrin argument: the next (always the next) President could reclaim Kennedy's heroic mantle by boldly declaring, etc.

Unfortunately, the only way to become an elected official is to be better than anyone else at the game of taking campaign money in return for patronage favors (and we as an electorate know that), it is unlikely that politicians will be reclaiming moral authority any time soon. Besides, unearned deference to leaders is hardly a characteristic that *should* be encouraged in a democracy, if we want to remain one.

The political math could also be changed either by ensuring very powerful support or removing all significant opposition. Nobody expects the latter in this increasingly risk-averse and technophobic society. The former is perhaps not impossible, and that is the change that supporters of a governmental Mars mission rest their hopes on. Proselytizing politicians and the public about the virtues of a Mars mission certainly cannot hurt. At the very least, the materials and skills developed can be put to use by the sort of Mars effort that will have a greater chance of success.

The other solution, of course, is to not make use of political math at all. The math of economic development, of the Spacefaring Web, is not zero-sum. We can, as I pointed out last week, have books without taking money away from movies, or achieve that governmental impossibility, buying both guns and butter. No controversial governmental program, from the Vietnam War to the Clinton health care initiative, has succeeded in a generation. In that same time, scores of new industries have arisen, new technologies (including the space-related ones of remote sensing, GPS and cell phones) have been invented and popularized.

At the very crudest level of argument, economic development works, and governmental command has not. The fantasy of *First Landing* is that a governmental Mars program could get so far, not that its political enemies would be so ruthless and effective.

MarsNow 1.08
Red Tarzana
September 4, 2001

Several weeks ago I sketched alternate visions of a human future on Mars. This week, I'll begin to set out my own, a vision focused not on near-term planetary exploration, but rather farther out, on permanent settlement: William Penn more than Christopher Columbus, so to speak.

Why spend time on something so remote, so speculative? Easier to carefully choose the seeds to plant today than to weed next spring. Thus, by thinking now about the sort of society we want half a century or more out, we will have a guide for our first actions.

My Martian future has two deep roots: the Viking red rock panorama, and the principle that coercion is simply wrong. Call it the frontier perspective. As Case For Mars founder Penny Boston remembers Viking: "that first image promoted dreams of human exploration and adventure in this new 'place' and even made the idea of eventually living there seem plausible, and, more importantly, desirable." No coincidence that so many of the Mars community make their homes in Tucson, Albuquerque, Boulder….

The Mars I inhabit, by advocacy and zip code, is a nouveau-riche frontier town making a robust accommodation with a harshly beautiful desert. Scottsdale, Arizona, on the terminator between the expanding Phoenix concrete pan and the Sonoran Desert, lies halfway between Mars Hill in northern Arizona, where the best telescopic technology of the day allowed Percival Lowell to consistently describe a world of razor-edged canals, and the Apache reservation where Edgar Rice Burroughs dreamed of fierce Barsoomian warriors and haughty ruddy princesses. It's an analog site for what a newspaper article once cleverly called "Red Tarzana," after the Los Angeles suburb Burroughs financed: vaguely libertarian, a small-business boomtown where renewing a lease marks you as an old-timer, proud of the land but where population pressures yield infrastructure building rather than gridlock and brownout. Not everyone's Mars at all, but when the McDowell Mountains reflect the crimson sunset, it sure is mine.

While the frontier rhetoric can be overdone, many of us feel an increasing calling to these open spaces, newly-built towns where we can make a fresh start free of establishments and expectations. The still-booming cities of the American Southwest are among the last such places on the planet. A generation from now, likely there will be none here, and only the High Frontier will satisfy that deep calling.

The case for the frontier needs to be made more thoroughly, based on solid historical and psychological evidence. Quantifying this sense some of us have, that new vistas are essential to the full flowering of the human spirit, would be an immense benefit to the space movement. A project hopefully for another day. Yet, unarguably, the impulse is real, if not logically proven. Many of the Mars advocates I know were impelled into study and action by the photos from Viking or Pathfinder, of the half-familiar land just beyond today's reach.

Who will we be, those of us who first go to stay, and what will we bring with us? The Spanish came to the New World and built a bloody empire of resource extraction on their legacy of feudalism and Inquisition. The British brought a tradition of commerce and free private landholding, and built a democratic civilization. When we went to space, we went as cold warriors, leaving nothing behind when our race was won.

Will those who go to Mars be government employees accustomed to the minute-by minute rule of a distant Mission Control? Will they be independent researchers and builders united in a common enterprise, rather than under strict naval-style command? It should be clear that the worlds each would build would differ greatly.

Those first settlers must understand that they will be building a civilization. They, and we who support them, will choose the technologies to deploy there: social technologies as much as the industrial and biotechnical. The tools they bring will determine the things they build. I hope they will bring a sufficient grounding in politics and economics to enable them to make informed choices. What I would see them build is no utopia. No utopia at all, but something I call, with a nod to Robert Nozick, "Martian Meta-Utopia."

In *Anarchy, State and Utopia*, p.328, Robert Nozick describes the utopian project as one "to make all of society over in accordance with one detailed plan, formulated in advance and never before approximated. They see as their object a perfect society, and hence they describe a static and rigid society, with no opportunity or expectation of change or progress and no opportunity for the inhabitants of the society themselves to choose new patterns." Marshall Savage in his *Millennial Project* goes so far as to prescribe an appropriate palette for interior decorators in his paradise.

When utopianists come to power they are confronted by the problem that human nature is neither static nor "perfect," and that many dissent violently from the one conception of the good life. But utopia rests on maintaining conformity to the founding vision, and that conformity is – must be – maintained with secret police, show trials and mass executions. Not for nothing is a major history of the Soviet Union called *Utopia in Power*.

Neither utopia then nor a mindless excrescence on top of the culture of Boeing, Navy or NASA. Rather, meta-utopia, a set of institutions under which people are free to design communities as they would, the only principle being that membership in them cannot be compelled. A Mars of Chinese socialists, Christian fundamentalists, freewheeling capitalists and timid bureaucrats alike.

We need social experimentation, proving new technologies of culture just as Mars will prove new technologies of habitation and transport. Under a system in which anyone with the price of transport can come to Mars to live as they see fit, we will learn which cultures succeed and which fail, in attracting adherents, in facing the hardships of the environment.

Red Tarzana is the culture I would build, with no law but the Wiccan Rede: "an it harm none, do as thou wilt." I don't know how many would join me in the building, or, once built, how

successful it would be. But in a Martian meta-utopia, or an open marketplace of social ideas, I'd have the opportunity to prove my case, just as others would.

I began by stating that initial conditions determine outcomes. How might we act now to develop a meta-utopia later in the century? An obvious place to start is in the space movement itself. We – all of us, scientists, academics and advocates alike – could make the case for our own desired outcomes while working cooperatively towards the common end of getting us all into space in order to get started.

To date we've been much better at utopia than the meta variety: we've filled bookshelves with our static pictures of spacefaring civilizations or ideal technologies. We've pursued ideological agendas and squabbled and warred amongst ourselves over obscure points of doctrine and old rivalries, to the extent that the space community is the envy of any Balkan militia. What we have failed at is the creation of a framework in which any of us, let alone us all, are able to get into space to start building.

We will only get there when we accept the notion of meta-utopia, that first-level cooperation on building the infrastructure to support us off-planet must proceed any of our efforts in building the future worlds of our particular imaginings. As I've said before, I relish those arguments over the nature of the good life – so much that I'd like to see them rehashed on the Moon, and Mars, and through every corner of a human-occupied solar system.

There's much, much more to be done. All of us must begin to cooperate where possible to build the infrastructure that will sustain us in exploring and settling the solar system. Once where we want to go, we can build our own particular communities, be they Lunar Houston or Red Tarzana.

The Spacefaring Web 1.14
Martian Dynamism
October 30, 2001

Regular readers of this column will observe that its title is something of a misnomer: rather than focusing solely on "Mars now," depicting and advocating current efforts building towards the permanent settlement of Mars, it has described the process necessary to get there: the expansion of the Spacefaring Web. Though the process and the goal intertwine in interesting and complex ways, I do draw a distinction. For many in the space movement, the Spacefaring Web is goal enough in itself: their imaginations are fired by the immediate or infinite extension of the web. My primary interest, though, lies in building a new culture pulling together the best of what humanity has built so far and ensuring the its constant evolution. Mars uniquely provides the most likely home for such an enterprise in this century. This column will provide a general overview of my reasons for drawing that conclusion, touching briefly on a number of theses to be explored at length later.

A good society, in my definition, enables individuals to attain their fullest development. Freedom from coercion is an essential component, along with those things subsumed by the term "development:" innovation, economic growth, prosperity, increases in health, longevity and knowledge. Other definitions of a good society are possible, as evidenced by the violent global debate on the subject currently under way. The logical and ethical arguments underpinning my definition are beyond the scope of this column; anyone interested may contact me directly.

Given this criterion, most reasonably imaginable offplanet settlements will be superior to most Terrestrial cultures, though some, such as Silicon Valley, will retain advantages in certain respects, given their greater ability to meet basic survival needs, such as air and food. While it could be argued that O'Neill colonies in the asteroid belt would provide for a more diverse and felicitous civilization than Mars, the potential economic riches of the Belt are likely to skew development – looking more like the Spanish Main than New England. For now, building a genuinely freer and more innovative society should be easier and more likely on Mars.

The factors necessary to sustain a culture maximizing individual freedom are fairly clear. Several authors, addressing the issue from radically different perspectives, have elicited almost identical criteria. David Landes, an economic historian, in *The Wealth and Poverty of Nations: Why Some are So Rich and Some So Poor*, sets out the following as an explanation (p. 217): he defines a "growth-and-development societies" as one historically that

1. Knew how to operate, manage and build the instruments of production and to create, adapt and master new techniques on the technological frontier.
2. Was able to impart this knowledge and know-how to the young, whether by formal education or apprenticeship training.
3. Chose people for jobs by competence and relative merit; promoted and demoted on the basis of performance.
4. Afforded opportunity to individual or collective enterprise; encouraged initiative, competition and emulation.

5. Allowed people to enjoy and employ the fruits of their labor and enterprise.

He includes several corollaries, including valuing "new as against old, youth as against experience, change and risk against safety," (p. 218) a lack of discrimination based on irrelevant characteristics, and a government which secures rights of liberty, property and contract. Small-scale enterprise, as a consequence of difficult environmental conditions and a labor shortage (p.296), also play a critical role, preventing the creation of a stratified class system of idle owners and miserable producers. Describing colonial America, Landes observes that its

> …society of smallholders and relatively well-paid workers was a seedbed of democracy and enterprise. Equality bred self-esteem, ambition, a readiness to enter and compete in the marketplace, a spirit of individualism and contentiousness. At the same time, smallholdings encouraged technical self-sufficiency and the handyman, fix-it mentality…. Meanwhile, high wages enhanced the incentive to substitute capital for labor, machines for men. (p. 297)

That similar conditions will occur on a Mars with open settlement is likely. Again, a detailed analysis of how such a Mars might – and might not – come into being awaits detailed analysis in a later column.

In *The Future and Its Enemies*, Virginia Postrel (http://www.dynamist.com) distinguishes "dynamist" and "stasist" societies. She notes that '[s]ettling new territory requires serious thought about fundamental rules, thought that not only shapes the new world but can reshape the old. This is a matter not simply of philosophy but of practice, since pioneers must evolve new rules to govern the new landscape." (p.117) She continues, "[b]oom towns break down barriers; they mix together talent from everywhere; they challenge complacency and overturn assumptions. They are sometimes ugly and almost always stressful, but they foster invention, progress and learning. They let people chase their dreams." (p.192) Her chapter "On The Verge" is a powerful refutation of the clash-of-cultures bellicosity of Islamic fundamentalists and American triumphalists alike. Replacing static conflict with dynamic synthesis is one reason why we so desperately need the High Frontier. Again, rapid, open settlement of Mars – going beyond the stasist conception of a scientific outpost – will generate the creative verge of a multicultural boomtown.

Robert Thurman, a professor of Indo-Tibetan Buddhist studies, sets out a similar answer to a very different question in his book *Inner Revolution: Life, Liberty and the Pursuit of Real Happiness*. In explaining how Tibet developed a uniquely complex spiritual culture, he stresses its geographic isolation and relative material scarcity: "[n]o one, until modern times, wanted to conquer, colonize or incorporate Tibet." (p.32) Tibet imported individualist ethics and practices from its parent culture, India:

> [r]adical individualism, which makes the individual's need to attain full development the highest good, is the key to preserving the openness necessary for a truly political society. For

> individualism to flourish, it requires an economic surplus, and India had the greatest wealth of the ancient world. It needs some form of education that encourages the development of critical thinking, and a social matrix that extends support to nonconformity." (pp.93-94)

Similarly, Mars will be built from a meritocratic, rationalist, individualist culture in conditions of material hardship that will force innovation.

Dynamic cultures can be built on Earth. Las Vegas is a marvelous example, as is Silicon Valley and similar centers of technological entrepreneurship around the world. Cyberspace, despite the best efforts of the FBI and the Chinese Communist Party, is still dynamic. The space movement is – to the extent that it draws in new blood from other dynamic cultures, to offset its statsist, stasist, sclerotic old guard. But even these cultures are embedded inextricably in a confining matrix of nanny laws, risk aversion, aging infrastructure, useless schooling, and the million and one limitations of an old-world outlook.

Building afresh, building new-world boomtowns, requires escape velocity from Earth's red-tape gravity well. Orbital habitats certainly will not be free, particularly in the case of multi-governmental projects like the ISS, in which each government's contribution of rules, procedures and laws outweighs that of its hardware. It is difficult to imagine an orbital hotel, construction shack or research platform of the next twenty years not being the most heavily regulated of all human activities.

The Moon will be no better, being nearly as close in commuting time – not to mention voice, video and email – as Asian and European subsidiaries of the same conglomerate. Asteroid colonies, as noted above, are likely to be both too distant in the future and, paradoxically, too economically attractive to favor steady settlement and smallholdings, keys to freedom.

Only Mars will be to Earth as America was to England, or Tibet to India: far enough away –and just poor enough – to be left alone by imperialists, bureaucrats and buccaneers, yet close enough for creative cross-fertilization, for being part of the same web, able to draw the best out from Earth and return the prime Martian export: newer, freer and more rewarding ways to live.

The Martian effort isn't just another set of linkages in the Spacefaring Web. To the extent that that web is a dynamist culture itself, it's a petri dish for a new Martian culture (with a tip of the hat to Chris McKay and Elon Musk), a best approximation and testbed for new means of human enterprise and interaction.

But it is on Mars where the new ways of the network society have the best chance of becoming the dominant means of interaction, at the greatest remove from the rigor-mortis group of the old world. There is much more to be said in detailing this conclusion, particularly in how it is shaping and being shaped by current understanding of the processes for conducting an expedition to Mars. But at the broad level of economic, political and cultural analysis, the conclusion is clear: our best hope for human freedom will be found in our remote, hardscrabble life on Mars.

The Spacefaring Web
1.19 The Martian Alternative
January 9, 2002

Will planetary settlements avoid the structural limitations on freedom which would seem to plague L5 colonies, and is there any way to enable social experimentation and diversity in a space habitat? Definitive answers must wait on good data on the costs of particular settlement technologies, work which as far as I am aware is yet to be done. However, some preliminary conclusions are possible. In the first few generations, L5 colonies will be constrained by economic and concomitant political limitations, while cheap shelter may enable an explosion of diversity on Mars.

The only likely reason for creating an L5 settlement is to provide worker housing for space-based export industry: to create an economic colony. A structure like Gerard O'Neill's Island One, a one-mile sphere housing 10,000 people, will likely cost on the rough order of a trillion dollars. Only a very large industrial complex could produce a return justifying such an investment. Minimizing investment risk will likely entail minimizing potentially disruptive social experimentation (including dissent and whistle-blowing), while the builder/owner's monopoly on basic resources (including air) will provide a powerful lever for control.

Martian settlements may face looser economic and political constraints. The planetary environment provides resources ready to hand that an L5 settlement would have to import from Earth or the Moon and then process more extensively: the atmosphere provides some radiation shielding, and the costs of covering a structure with regolith are obviously much lower for something already on the ground than in deep space. Extracting useful materials from Martian regolith and atmosphere should likely be similarly cheaper than from lunar regolith transported to Earth orbit by mass driver, the most economically feasible way of supplying raw materials to L5. Arguably, the cost to construct a 10,000 person settlement on Mars should be at least one order of magnitude less than that of Island One.

Reducing the economic pressure to justify a return on investment would allow more marginal enterprises: more research and exploration, a greater focus on economic development for growth rather than production for export. Of course, it is difficult to imagine a viable Martian export industry in the first place (at least with Earth, rather than the asteroid belt, as a market). In short, a true settlement as opposed to a classic economic colony.

With economic colonialism as a lesser force, both motive and opportunity for coercion are lessened. Thus a Martian settlement should have more diversity and more opportunity for social experimentation than an L5 colony of like size.

But the truly interesting issue arises from the Martian ability to go beyond the "like size" comparison. O'Neill likely pegged Island One as the smallest economically viable space colony. Advances in robotics may well leverage a space-based labor force beyond what O'Neill envisioned, enabling a smaller number of people to generate adequate return on investment. However, the construction technologies and materials he describes imply a significant economy

of scale: given the requirements for reasonable self-sufficiency, one might as well build big. Assuming a global market for whatever the colony's industrial complex produces, gigantism in production also makes some sense.

The Martian situation would seem quite different. Given that some of the survival infrastructure is provided by the planet, and industrial export is much less of a driver, a self-sufficient settlement might be quite small. Hundred-person settlements would seem entirely feasible with respect to technology, economics, division of labor and social factors. Obviously, the cost of such a settlement would be vastly less than that of Island One, and probably affordable based on the incomes of the hundred people, assuming a first settlement with rentable or surplus construction materials.

Thus, anyone seeking an alternative to conditions on Island One would be forced to raise the trillion dollars to build a similar facility in order to have autonomy, while a comparable inhabitant of the first substantial Martian settlement would need only a few millions to buy their freedom. Inevitably, much greater diversity will be generated on Mars.

Critically, autonomy short of self-sufficiency seems much more viable on Mars than L5. Someone seeking to go it alone in deep space might be able to trade services for air, water and food – derived from materials imported from the Moon, processed by perhaps the most expensive labor in human history, and certainly priced with an outrageously high markup. They would still have to pay for a basic habitat with radiation shielding, navigational equipment and propulsion systems.

In the Martian case, the costs of locally-produced survival goods should be much lower. If small-scale atmosphere refinement is feasible, air and water costs may be negligible. Minimum shelter may be as cheap as an inflatable beach ball covered with regolith, equivalent in cost to a good mountaineer's tent. The difference in cost, and in its cultural implications, is enormous.

While we may in time see crusty old asteroid miners in single-person ships, that old staple of space opera, the first generation of space settlements should follow two paradigms. One, in L5, will be built around large-scale export industry, with fairly large communities looking much like current "privatopias" in design, legal strictures and social norms. Meanwhile, Mars will see a number of settlements ranging from solitary scientists, explorers, prospectors or sheer nomads upwards to towns likely much smaller than L5's Island One, there being no economic need for big Martian cities in the first generations. Low capital expenditures and little export industry will engender poorer (or, more positively, lean and frugal) settlements, but with the freedom to be politically independent and culturally diverse.

Interestingly, this late 21st Century division is already visible in embryonic form within the space community. The community divides roughly into entrepreneurs, explorers and pioneers. The entrepreneurs have always been closely allied with O'Neill and his heirs, notably within the Space Frontier Foundation. While some explorers look to deep space and the SETI endeavor, Mars has been the been the passion of many. The Mars Society talks less of pioneering now than in its early days, but its members are more likely to be found in the high desert or the Arctic than the average space entrepreneur, who may already live in a community much like Island One.

What we choose and build now, each of us in accordance with our natures, is setting the stage for the first generation's work in space. This paradigm allows some natural focus to our efforts: the commercially-minded will work on Earth-orbital projects, while the scientists and hardship-loving pioneers can build towards Mars. We can hope that these differences in temperament and focus will not impede effective cooperation within the space movement towards common goals.

The Spacefaring Web
2.12 Barsoom's Legacy
July 30, 2002

Edgar Rice Burroughs, best known as the creator of Tarzan, wrote ten novels set on a fictional Mars known to its inhabitants as Barsoom. Published between 1912 and 1948, these popular stories provided seminal inspiration for generations of youngsters who would grow into scientists and science fiction writers, including the likes of Ray Bradbury, Arthur C. Clarke and Carl Sagan. Writing in 1971, Bradbury (*Mars and the Mind of Man*, p.17) went so far as to say that "I also admit the terrible fact that Edgar Rice Burroughs was in some ways my father…. thousands of wild-eyed boys have fallen in love with [him] and had their lives changed forever. He has probably changed more destinies than any other writer in American history." Yet within a few years of Bradbury's writing, Barsoom had virtually disappeared from bookstore shelves and the popular imagination. Burroughs' decline holds important lessons for the marketing of Mars, as entertainment, educational subject, governmental program or private initiative.

Burroughs was one of the great marketing geniuses of American popular culture. His was one of the first creator-owned multimedia empires; his corporation, Edgar Rice Burroughs Inc., (still extant: http://www.tarzan.org) has licensed Tarzan movies and merchandise (and recently licensed the Mars novels to Paramount) for some four generations of fans. His first sale, *A Princess of Mars*, in 1912, revealed his brilliance in synthesizing pop-culture memes. Percival Lowell was at the height of his outreach efforts and popularity: Martian canals and intelligent life were memes as universal then as Roswell and Area 51 were in *The X-Files*' heyday. The ultra-hot pop culture genre was the Western; with "certain consistent, even programmatic elements: a hero who represented a synthesis of civilization and wildness; an affirmative finding with respect to progress; an emphasis on action; and a setting of epical import – usually vast, wild, open spaces." ("The Literary West," Thomas J. Lyon, in *The Oxford History of the American West*, p. 712) Burroughs had served in the Indian-fighting U.S. Army in the same landscape that was informing Lowell's visions. Drawing on all these elements, he created a Western adventure set on a dying Mars. The Martian/Western was a huge hit, and an immensely sticky meme: to this day, much of the factual and fanciful speculation over the nature of Mars – and a human future there – struggles in the tar of the "Mars as Arizona" meme.

Why did Barsoom appeal for so long, only to fade in the mid-1970s? To some degree, science erased Lowell-based imagery: through the age of telescopic astronomy, the Lowell/Burroughs vision remained, if not entirely plausible, at least not disproven. Mariner and Viking were the death knoll for tales of canal-building Martians. But the cultural reasons for the stories' decline are more significant.

Prior to the Mariner and Viking era, American popular culture had been largely unitary, both the cause and result of fairly crude, monolithic systems of meme-distribution. In Burroughs' day, Henry Ford could give us cars in any color we wanted, so long as it was black. By 1970 Alvin Toffler looked at the birth of customization and niche marketing and saw a social revolution of fragmentation: *Future Shock*. The trend began with the rise of rock music and youth-oriented

marketing in the later 1950s. The 1960s and early 1970s shattered American cultural uniformity in every respect, from politics to music to fashion.

One critical breakdown of consensus was over the meaning of Westward expansion mirrored and upheld by Burroughs. In the 1970s Native American writers and organizations began reaching a broad public with their side of the "conquest of the West" story; cowboys-and-Indians began to die off as a childhood game. Environmentalism and the direct experience of Western wilderness through the rise of backpacking challenged the construction-and-exploitation ethos that had urbanized the West. A generation of children born in the Western states knew nothing but city life; they lacked the experience of moving from the old East to someplace new and alien that enabled their parents to identify with the Western-frontier memes. The Western genre itself effectively died: in 1957 seven of the top ten television shows were Westerns; by 1977 the count was zero, and John Wayne was dead. Along with him died the living legend of the Wild West, the frontier. Shortly, though, Ralph Lauren (and arguably Ronald Reagan) would bring it back as nostalgia, a very different thing.

The death of the uncomplicated, pre-revisionist Western memes is as much of a sure thing as can be found in cultural studies – as any number of Hollywood executives who've speculated financially on a revival have learned. Yet space advocates in particular are given, sometimes fanatically so, to using them. This is readily explicable: the Western-frontier myth was at the height of its popularity from about 1957 to 1965 – the impressionable pre-adolescent years of the baby boomers (someone once remarked that the "golden age of science fiction" is twelve); the birth of the American space program, steeped in Westward-ho imagery; and, of course, President Kennedy's "New Frontier." Given how few people ever entertain a new idea after age 25, it's little surprise that some continue to sell a product – space as Manifest Destiny – that isn't exactly flying off the shelves.

This is not to say that the Mars (or space) as West meme is dead; far from it. Rather, there are a plethora of such memes, constantly evolving and speciating to match the diversity of meanings the West holds for various groups. While some do still hold the old triumphalist views of Western expansion, many view the Western legacy through lenses of cultural and environmental revisionism. Historical preservation and environmental protection, limits to growth, the boomtown, gambling, entertainment and tourism – each of these is the foundation of its own Western image.

Post-Viking (and post-*Bury My Heart at Wounded Knee*, a contemporaneous revisionist bestseller), we lost the Mars of Apache warriors and Bureau of Reclamation waterworks but gained a sense of the planet that paralleled our social and environmental concerns (and prejudices) here on Earth. The modernized Mars/West analogy has informed numerous contemporary Mars novels, from the Navajo astronaut of Ben Bova's *Mars* though Kim Stanley Robinson's "Reds" to the Sonoran techno-dissenters of Paul McAuley's *The Meaning of Life*. Astronomer/artist William K. Hartmann uses Mojave landscapes as backgrounds for his Mars exploration paintings and paints the Sonoran desert with skies out of Chesley Bonestell's Mars. The Mars Society's desert hab combines science with meme-nailing showmanship in a manner worthy of a Lowell. In the next column, I'll look at some current Western imagery alongside

new Mars fiction, to highlight how far the cultural center of gravity has shifted from the "shoot it, pave it and dam it" frontier.

What we have lost is not the meme but the mono-meme. The hope of creating a grand, unifying vision of a Martian New Frontier, complete with neo-Kennedy presidential commitment, can only shatter on the reality of American cultural balkanization and fractal marketing. It's notable that even James Cameron, at least as great an entertainment-marketing titan as Burroughs, has yet to bring any of his Mars projects to fruition. While some cultural memes do become nearly universal, at least in capturing a sense of the times – *The X-Files* and *Seinfeld* in the 1990s, *The Bonfire of the Vanities* and *Miami Vice* in the 1980s, there is no clear post-9/11 zeitgeist and no one uncontroversial meme for Mars.

Rather than marking the impossibility of mobilizing cultural forces for Mars exploration, the death of the unreconstructed frontier myth is instead a great opportunity for diversity of expression, in storytelling and, in time, on Mars. Burroughs' Wild West Mars was supplanted in the postwar generation by Mars as Southern California: stultifying suburbia and Cold War industrialism. Bradbury, Philip K. Dick and others gave us Martian dystopias to match the real dystopia of the times. In reaction against social ills, the American monoculture of the 1950s was undone by dissent, allowing new forms of self-expression, new opportunities to seek out the like-minded of every persuasion, right and left, traditional and revolutionary.

Likewise, the lack of a single universal meme supporting Mars exploration prevents the replication of that monoculture on Mars. The diversity of constituencies, rationales, goals and imaginings of Mars exploration should ensure similar diversity if and when we get to Mars. There will be no "Red Tarzana" – Mars will not be a government-sanitized image of suburban Houston, the way Low Earth Orbit was for forty years before Dennis Tito and ,hopefully, Lance Bass.

For this, most all of us ought to be grateful. Especially the next generation's children, who may reach that "golden age of science fiction" looking out from station, hab or rover onto the red world, dreaming of exploration and swashbuckling adventure, of genuinely being able to boldly go where no one has gone before. They'll want tales of derring-do: Barsoom may just live again.

This column, along with the subsequent issue, *Spirit of Mars*, formed the basis for my presentation on the "Mars: Past, Present and Future" panel at ComicCon, the World Comic Book Convention, on Sunday, August 10. Hosted with great professionalism by the San Diego Mars Society (http://chapters.marssociety.org/SanDiego), the panel (myself, space entrepreneur Jim Benson, science fiction authors Larry Niven and Kevin J. Anderson, and Dr. Michael Caplinger of Malin Space Science Systems) packed a standing-room only crowd into the only science-based presentation at the four-day event. Mars is alive and well in the popular imagination.

The Spacefaring Web
2.13 Spirit of Mars
August 13, 2002

For nearly a century Mars has been the blue screen onto which we project, in scientific speculation as well as literature, two powerful concepts: the West and the Other. Looking at the sequence of imagined Marses (see the previous edition of this column, "Barsoom's Legacy"), we see the evolution of American hopes and fears. In turn, these projections continue to shape the meaning of Mars for us. Any attempt to advocate Mars exploration and settlement must be grounded in an understanding of the nuances of those memes of West and Other in our culture today. Central to Americans as motherhood and apple pie, they define the boundaries of the possible.

We find these memes expressed in both the Mars novel and the Western. The two have a common heritage in the pulp magazines of the early decades of the last century. Indeed, one of the great pulp writers, Edgar Rice Burroughs, published in both genres. His first novel, *A Princess of Mars*, literally began in the Wild West of Arizona before shifting to Mars. This linkage still continues, down to the latest entries in each genre. Few might think to combine Paul McAuley's biotech Mars novel *The Meaning of Life* with Dreamworks' animated Western, *Spirit, Stallion of the Cimmaron*. Yet together the two works absolutely nail the zeitgeist, highlighting current views of the meaning of the West and the Other, with clear implications for Mars exploration.

Spirit perfectly illustrates both the evolution of the sentiments expressed in the Western and the likely popular attitude towards any life on Mars. The story of a young stallion's encounters with the American army and its Native American enemies, a generation ago the movie's hero would have been the dashing colonel trying to break Spirit to the saddle and productive use. A decade ago its hero would have been the American Indian boy, so gentle with his own horse, Rain. But in our own time it is the indigenous lifeform that's the hero: Spirit escapes from technological man, is set free by "green man," and builds his own wilderness paradise away from humanity entirely. The humans see the wisdom of this, leaving Spirit and his kind to themselves in the forbidding redrock canyons of the frontier. Substitute Martian microorganisms for Spirit, unreconstructed old-guard engineers for the colonel and "Greens4Mars" for the young Indian boy, and you have the future history of the next decade. The "wild and free" ending is undeniably the one that sells now, a fact best taken into account by mission planners.

In *The Meaning of Life*, a Chinese expedition has found Martian microbes – and kept the discovery as the proprietary basis for new biotechnology. An industrial accident threatens the survival of ocean life as the hybrid spreads unchecked. A NASA expedition is mounted to recover specimens in hopes of developing a countering agent. Meanwhile, across the American Desert a technophilic counterculture is growing in opposition to the machinations of the biotech giants and their wholly-owned governments. Armed with the leaked Martian discoveries, they begin to mount a challenge to the global monoculture in the name of freedom.

The real element of fantastical speculation (aside from the notion of a NASA human Mars mission) is in McAuley's creation of an opposition to globalization from within what Dinesh D'Souza (in *The Virtue of Prosperity*) calls the "Party of Yeah" – educated, technophilic, humanistic tolerant optimists, rather than the medievalists of the far right and left. In Robert Zubrin's Mars novel, *First Landing*, the opposition to Mars efforts is fueled by the same pervasive fear of the Other, but comes from a more expected source, the "Party of Nah." "Nah" is the Seattle movement, that united front of the backward-looking on the right and left, literally Luddites, the smashers of machines. Driven by fears of alien contamination, these activists call for stranding the crew on Mars. McAuley posits elements within his crew working with a technophile underground for freedom and biological preservation. His heroes support exploration along Antarctic lines, but stand against commercial use and political manipulation. This view currently has a solid core of support within the space community, with Kim Stanley Robinson as perhaps its most articulate and widely-heard champion. Is it the position closest to where a popular consensus would lie if the issue were widely considered today? Might the current wilderness-preservation ethic serve as a common bond between Yeah and Nah as the basis for a broad opposition to Mars settlement or exploitation?

The setting of both *Spirit* and *The Meaning of Life* indicates the power of the Western conservation memes in shaping a consensus about development. It is fitting that the land that naturalist Gregory McNamee calls the "Holy Sonoran Empire," the land from which Burroughs' hero began his sojourn to Mars, would be the birthplace of freedom for the Stallion of the Cimmaron as well as for McAuley's forward-looking humanity. The Great American Desert has always held an inexorable attraction for the dissident from mainstream American culture. The Mormons stood here against Spirit's adversary, the US Army, avidly terraforming while deeply appreciating the red land. The environmental movement won a landmark victory here in the early 1960s when it prevented the damming of the Grand Canyon. Another band of radical activists formed here: the Mars Underground was born in Boulder, Colorado, and a generation later its founders can still be found there and in other arid places West. Perhaps McAuley's vision is not so far-fetched. Vivid dreamers, redrock scientists, atom splitters, land defenders, still-viable indigenous communities, all scattered across the red desert – they might be seeds of some hopeful new future. This is the shape of the "frontier" at the beginning of the 21st Century.

And yet there is that other great meme beside the Frontier: the Other. Spirit and his band in proud isolation, bioterror, fear of "Frankenfoods," the mythic pull of that sense of hubris that comes from tampering with raw life, all powerful images that resonate strongly in current popular culture. The prospect of microbial life on Mars is a nexus of our fears of the alien, of our own Faustian powers, of that revisionist Western history that sees cultural and literal genocide where our grandparents saw the white man's manifest destiny. A happy ending to the story of discovery of life on Mars may well be the brave microbes winning their freedom from the ruinous presence of man.

Would that in fact be a happy ending? Some would strongly disagree: Spirit's horse-breaking colonel is alive and well at the fringes of the spacefaring discussion. "Nuke the red bugs" is a sentiment one hears from Southern California's old Star Warriors. Spirit's story is a measure of how little influence they would have over popular culture should the issue arise. Everyone boos the colonel till he wises up at the end.

Our ethical views shaping our answer to the question of the rights of any indigenous Martian life may be informed by other data available when the question becomes ripe. By the time we look for life on Mars in a serious, comprehensive way we may have preliminary data from the search for terrestrial planets. If Earthlike worlds are common as grains of sand, we may well choose to leave Mars alone and wait on planetary settlement until we can reach more congenial, or more sterile, worlds. If they are rare and Mars represents a near-unique opportunity, keeping an entire planet off-limits as a microbial preserve may seem a lesser good than some form of human intervention.

The moral calculus involved will be complex and subtle. More nuance, more ethical debate now might shape the parameters of later discussion. There are other positions than the colonel's, an entire spectrum of ethical views ranging from conservative "wise stewardship" through a range of green positions short of bacterial triumphalism. The more each position is expressed, transmitted into the popular culture, and allowed to shape that culture, the better off we will be. One of those positions will form the basis for popular opinion when the time comes to address Mars seriously across society. There will be a consensus as to what we should do about Mars: to ignore it, or explore lightly, settle, terraform, or something else entirely.

Today that consensus would likely call for leaving the wilderness alone. A new decade, though, may replace Spirit with a new frontier hero, a new cultural response to the memes of Frontier and Other generated by the perception of Mars. That response will reflect who we are as a people at that time. White-paper policy will not determine it, zeitgeist will Our answers may come from a young generation standing on Arizona mountains and Utah slickrock, spreading their arms and dreaming of Mars. Or from the summer hit Western of 2015.

This column along with its predecessor formed the basis for my presentation on the "Mars: Past, Present and Future" panel at ComicCon, the World Comic Book Convention, on Sunday, August 10. Hosted with great professionalism by the San Diego Mars Society (http://chapters.marssociety.org/SanDiego), the panel (myself, space entrepreneur Jim Benson, science fiction authors Larry Niven and Kevin J. Anderson, and Dr. Michael Caplinger of Malin Space Science Systems) packed a standing-room only crowd into the only science-based presentation at the four-day event. Mars is alive and well in the popular imagination.

The Spacefaring Web
3.14 The Rights of Mars
July 27, 2003

Recent evidence of vast amounts of water ice on Mars (http://www.spacedaily.com/news/mars-water-science-03k.html**)** supports the possibility of indigenous life. At the same time, that water could enable human settlement and massive environmental engineering, or terraforming (http://www.users.globalnet.co.uk/~mfogg/index.htm). A moral conflict could face us soon, pitting Terrestrial life against the Martian. The course of action we choose should be informed by broad debate: the ethics, as much as the biology, of Mars deserves full exploration.

Should intelligent extra-terrestrial life be discovered, presumably through a deep-space signal (http://contact-themovie.warnerbros.com/main.html), the scientific community has a well-developed set of protocols for determining its response (http://www.seti.org/science/principles.html). No such protocols exist for responding to a discovery of microbial life (through there is a proposal to formulate them: http://www.seti.org/pdf/m_race_guidelines.pdf). Oddly, the prospect of primitive life is the more controversial: our concept of the appropriate response is shaped by our views on environmental ethics, where profound disagreements on basic assumptions divide us in our daily lives as much as in our views of a future on Mars.

There are three broad positions in environmental ethics (drawn from Randolph, Race & McKay, "Reconsidering the Theological and Ethical Implications of Extraterrestrail Life," http://www.seti-inst.edu/pdf/m_race_ethics.pdf):

1. *Preservation* is the belief that humans should minimize their actions in nature. In Terrestrial environmentalism, this belief is often accompanied by the views that humans stand apart from nature, and are negative and destructive agents. But another familiar formulation of this view is *Star Trek*'s Prime Directive, holding that non-interference with primitive alien life is the highest wisdom. A preservationist view would have us leave Mars alone, certainly if there is life, and also even if there is not - "all we could do is screw it up" is a sentiment commonly heard.
2. *Stewardship* is a human-centered, utilitarian approach. Stewardship sees humans as the only moral objects, with nature as resources and objects rather than as moral agents with their own rights. Often founded in Biblical concepts of man's dominion over nature, the only constraints on human actions that stewardship recognizes are against the illogic of waste and the self-demeaning effects of wanton cruelty or destruction. Stewardship would support our propagation on Mars unless indigenous life represented some uniquely valuable resources, e.g. as a source of pharmaceuticals (as in Paul McAuley's novel *The Secret of Life*).
3. *Intrinsic Worth* holds that humans are not the only things with rights and moral standing, that others are equal to humans in the eyes of moral law. Those others could include all sentient beings, all life, or all of nature including the inanimate as well. Depending on how broadly the net of rights is cast, this position could either have us preserving Mars

out of respect for the rights of the inanimate, leaving it to its indigenous organisms, or terraforming it in the name of sentience.

These positions are well-developed in general application. Environmental ethics is a vibrant field which has seen both outstanding scholarly work and a broad exchange of ideas and values among the academic community, professionals and activists, and the general public.

Through that interchange, all of the positions have matured in recent decades: Preservation is no longer only the ideologically reflexive anti-humanism of environmentalist extremists. At its best it manifests as an informed humility in the face of unintended consequences. Stewardship has drawn from economics and utilitarianism to inquire into the best balance between short-term gains and long-term interests, transcending its roots at the intersection of Christian fundamentalism and paper-mill PR. Intrinsic Worth has built beyond its basis in Western philosophical inquiry to include the rich literature of Buddhist ethics and the inspired creations of artists and poets in close contact with nature.

Each of these positions deserves better than to be embraced or condemned lightly, in unthinking ideological response. All the more so, applying them to the problem of Martian microbial life requires careful re-consideration.

All of environmental ethics to date, with the exception of a handful of essays on the ethics of astrobiology, assumes that life and nature are coexistent, that both humanity and the rest of the biotic community are relatively powerful and resilient entities. Interconnection and interdependency now cannot be denied, though the various positions see relatively more or less of them.

Not necessarily so on Mars, where any indigenous life might occupy only the smallest toeholds, susceptible to the powerful technologies of humanity, where most all of Martian nature is utterly inorganic. The calculus of strength and value for humans, indigenous life and inanimate nature formed in the rich Terrestrial environment will have to be determined afresh.

Would Martian microbial mats be morally equivalent to human settlements? To Native American nomadic bands faced with European conquest? To redwood forests faced with the chainsaw? Or would planetary ecocide be, as some of the tackier Mars Society leadership has put it, no different from "cleaning a toilet?" As with polar field teams, terrestrial analogies are highly instructive - up to a point.

Another unique consideration in the extra-terrestrial context is the issue of a "Second Genesis." If there is life on Mars, did it evolve independently, or is it related to Terrestrial organisms through meteoric transfer of organic compounds? For some, including Chris McKay of NASA/Ames Research Center, the question of a Second Genesis lies at the core of ethical decisionmaking.

In this view, if any Martian life is related to Terrestrial extremophiles, while interesting, it would claim no greater rights than similar lifeforms on Earth. However important one holds primitive bacteria on Earth, one should regard their Martian counterparts the same. For most people, that

"cleaning a toilet" analogy might apply, short of extinction and allowing preserves for scientific study.

Yet if Martian life represents a Second Genesis, those bacteria hold the same moral weight as all the uncountable species and rich diversity of Earth, and altering its environment to make way for ourselves would be as great a crime as aliens scouring our continents down to bedrock to make Earth safe for methane-breathing lizards.

Indeed, McKay sees a Second Genesis as imposing on us an affirmative moral obligation, not just to avoid contamination through "biologically reversible exploration," the subject of his presentation at the upcoming Mars Society conference (http://www.marssociety.org/convention/2003/index.asp), but to engage in "restoration ecology:" actively transforming the Martian environment to encourage the spread and diversification of indigenous lifeforms.

This notion is an astounding one, as breathtaking in its uncompromising idealism as in its technological daring. Terraforming, the process of creating conditions on Mars capable of supporting human and other oxygen-breathing life, is a familiar concept both in science fiction (e.g., Kim Stanley Robinson's Mars trilogy) and in technical literature (http://www.users.globalnet.co.uk/~mfogg/index.htm). Restoration ecology, sometimes called ecopoiesis, would use those same massive technologies to turn Mars into a CO2-rich utopia for plants and anaerobic bacteria. "Mars for the Martians" is its supporters' slogan, countered by the scornful "Mars for the Microbes" of terraforming advocates.

Even in the absence of indigenous Martian life, the environmental-ethics dilemma remains acute. Many of us with a powerful affinity for Mars first felt its pull from the Viking panoramas of the beautiful, sere red desert, of Mars as it is. The call of Preservation, of living on and glorying in that Mars-as-it-is, can be a powerful and sympathetic voice.

An extraordinary number of old Mars hands have chosen to live in the Great American Desert between Boulder and Tucson, Death Valley and White Sands, drawn in part by an affinity with the red world. Much of Terry Tempest Williams's *Red*, a tribute to the heart of that region, could have been written of Mars. When Frederic Turner writes in his epic poem of terraforming, *Genesis*, that "the unwritten poem is the barren planet, and the composition of the poem its cultivation by living organisms," it is not hard to echo Williams's cry before Congress, "We are talking about the body of the beloved, not about real estate." What Robinson called the "Red" view is a coherent, attractive moral stand.

Yet Turner's voice resonates as well, in the sacred duty of life to expand, and in our moral role as the agent of vitality in a dead cosmos. As he later writes, "We are the bees by which the living world/Will fertilize itself across the voids." Turning lifeless rock into a living garden, ensuring the safety and continuation of Terrestrial species in a second home - what greater or more righteous calling could be envisioned?

And how could Mars be any less unique or glorious with water flowing in its valleys, with its cliffs become fjords on the shores of a Boreal Ocean? Even on a fully terraformed Mars, some

future Williams could write, "where we live, red is endemic, finding its way into every opening, large or small, seeping into each pore of the skin, staining fingers and toes…. At night, red dirt colors our dreams as we rub our eyes, scratch our eyes, sneeze, cough, as each red particle of sand works its way into the nucleus of every living, breathing, multiplying cell." How much better, then, a Mars still every bit the red world but full of life?

Last week I put these questions to an audience at ComicCon, the World Comic Book Convention, as a guest of The Mars Society/San Diego (http://chapters.marssociety.org/SanDiego/). The full spectrum of opinion was represented, though with many fewer and less fervent Preservationists than I expected. There was a loose consensus around the "no Second Genesis" position - that any indigenous life should be treated with respect, but subordinate to settlement and the propagation of Terrestrial species. I intend to repeat this experiment to a broad variety of audiences, raising the issues, inviting debate and seeking consensus.

There are no easy answers here, no certain duty but to consider our options thoughtfully and respectfully. Indigenous life or no, as we proceed with exploration, we owe it to ourselves, and to Mars, to act with clear and considered intent.

The Spacefaring Web
3.15 Pictures From An Expedition
August 14, 2003

Our culture seems determined to erase the line between entertainment and reality, a trend to which not even drier-than-old-toast space missions are immune. Last week's telepresence wedding from the International Space Station (http://www.spacedaily.com/2003/030811064105.mdaz12it.html) and a novella in the September 2003 issue of Fantasy & Science Fiction Magazine both illustrate the conflicts between space agency script and astronaut performance, between mission objectives and public-relations demands. Cosmonaut Maenlchenko's balancing act between the demands of fame and government employment may well be a picture of things to come.

The photograph (http://www.space.com/imageoftheday/image_of_day_030811.html) of Malchenko's bride posing with a lifesize replica of her husband was funnier than it should have been. *There* was the perfect government astronaut, a cardboard cutout who couldn't go off-script. To our delight and the Russian space agency's consternation, the real groom was actually a warm-blooded, independent-minded human being, who wanted to marry without government review but with his allotted 15 minutes of fame.

Malenchenko tapped an old Soviet-era reflex in an agency usually more cognizant of human foibles than NASA has been. From NASA, we've come to expect such public-relations self-sabotage as turning away private space traveler Dennis Tito at the gates of Johnson Space Center.

That both Tito and Malenchenko triumphed over their governments' boorishness is a tribute to their good humor and determination. It bodes well for the opening of an era of spacefaring, when space travelers and residents will live lives, rather than merely accomplish missions, in space.

Yet, unlike in Tito's case, thin popular interest in Malenchenko's wedding failed to tip the couple into celebrity status. A Space.com editorial (http://www.space.com/news/commentary_hollywood_030808.html) bemoaned public preoccupation with entertainers over astronauts, blaming NASA's failure at self-marketing: "Call Hollywood - NASA Needs A Makeover!" the article shouted. Though a well-reasoned and compelling piece, its argument contained two critical flaws: in equating NASA with humans-in-space, and in looking to entertainment marketing as a solution to our lack of a major space enterprise.

While no one seems to condemn other government agencies on similar grounds, ruing the lack of Bureau of Land Management examiners in Playboy spreads, for example, NASA has always been held to different popularity standards. Its fiercely-defended monopoly on American space travel has led to space insiders and the general public alike equating the government space agency with the whole notion of human spaceflight. Wishing for greater interest in one becomes calling for support of the other.

Government employees are supposed to be uncontroversial and self-effacing: we all pay for them, so they must represent all of us, at our least common denominator, rather than appealing to any controversial attitude or type. Drab efficiency is the ideal, not a failing.

Critics are right: there is no reason why astronauts should be nondescript and inarticulate. However, there is no reason why astronauts should be government employees. The flaw is not with NASA's marketing, but with its monopoly.

Yet pitching astronauts as media celebrities may have its dangers as well. The past decade saw space advocates and science fiction writers push scenarios in which human space missions were supported by the sale of entertainment rights: exploration as Olympics, as it were. Largely these plots lacked depth of understanding of both the real business demands of entertainment marketing and the tedium of scientific work coupled with the languor of long-distance travel.

Finally, an insightful human-factors sensibility has been brought to the "space infotainment" scenario. Alex Irvine's novella "Pictures From An Expedition" posits a privately-funded Mars Direct-style first voyage - and then looks clearly at the damage to the crew wreaked by the celebrity spotlight.

The media and their audience single out the best-looking woman on the crew for all the attention - but show no interest in her answers, only in her cleavage. Lurid stories about the crew's sex life drown out coverage of their revolutionary discoveries. Online betting focuses on - and magnifies - the prospect of a violent crew death. Crew tensions echo through their constituencies on Earth in a destructive feedback loop. The trivial, brutal hoopla of popular entertainment necessary to finance the mission becomes the instrument of its undoing.

Irvine's story is the best real examination of the consequences of crew selection and media attention on a Mars mission, at least since Kim Stanley Robinson's *Red Mars* and companion story in *The Martians*, "Michael In Antarctica." It's astonishing that so few people have taken a hard look at the intersection of long-term crew dynamics with calls for turning exploration into entertainment.

One hopes that human-factors researchers will take note, bringing Irvine's issues into the professional literature and to the attention of actual mission planners, public and private alike.

If popstar crews and gladiatorial audiences would fail us, if government blandness and public apathy have failed us, what is there that we can do?

The answer lies in this column's title and thesis, in the development of a Spacefaring Web.

This web is a network of relationships, of collaborative projects, of voluntary contributions towards a common objective. It is a third way to make exploration possible, a way neither farfetched nor as evidently flawed as the governmental program or the corporate bread-and-circuses spectacle.

Both the governmental and entertainment models assume a passive audience of ignorant, worthless consumers. Governmental advocates assume that space exploration would not happen absent the expenditure of public funds, and the role of everyone not on the Federal payroll is to not object loudly enough to jeopardize the scheme. Entertainment advocates claim that people will avidly fork over money for space, but only if it offers half-naked Romans, lions and maybe a virgin sacrifice or two. Which view is the more cynical and elitist beggars determination.

By contrast with both, a networked model abolishes the distinction between producer and consumer. The network builds an enterprise in which everyone participates as producer and consumer alike, contributing value from effort and deriving value from the outcome.

Though the standard-issue network paradigms are open-source software creation and the growth of the internet, networked projects are nothing new. They're how most science has always been done, how Europe's cathedrals were built, how culture is created and sustained, and why market economies are so strong. Only the legacy of the past century's domination by totalizing governments and their corporate stepchildren has caused us to lose sight of this natural means of organization.

Today, the networked approach to space is growing, dare it be said, astronomically, while government programs stagnate and corporate space spectacles remain in the ghetto of shallow sci-fi.

A few examples: cheap access to space is a critical bottleneck for all our ambitions beyond the atmosphere. A solution is approaching, courtesy not of NASA's legion of abandoned X-vehicles nor any AOLTimeWarner rocketship, but from the open collaboration/competition of weekend volunteers, millionaires' hobbyhorses and hungry entrepreneurial startups around the world.

No giant corporation nor government has an active humans-to-Mars program -yet there is one, a global Spacefaring Web of universities, below-the-radar enthusiasts within NASA, Mars Society hab crews and dyspeptic op-ed columnists.

Various projects, from O'Neill colony design to solar-power satellite feasibility studies to space law development, all are thriving because people want to be participants, not spectators, in the great endeavor of building a spacefaring civilization.

No astronauts in People or Playboy? Good. Eventually the failure of government and corporate-entertainment approaches will become sufficiently obvious, though one despairs sometimes of many Baby Boomers ever relinquishing their dreams of Camelot.

Confronted with incontrovertible evidence of the failure of those approaches that treat us as sheep, as spectators, even the old space advocates, the governmental and Big Aerospace diehards, will recognize the value of voluntary labor, of the passion loosed by participation, of the growing strength of the Spacefaring Web as it goes suborbital, then on to Mars and beyond.

The Spacefaring Web
287.16 The Gravity of History
August 25, 2003

Tomorrow, August 28, 2287 (Terran Style), Earth will make its closest approach to Mars in modern history. If the brilliant blue-green star in our late evening skies means anything to us Martians, it is precisely that history whose tidal pull we can never escape. Looking upward, we find ourselves looking backward, to our own origins in the time of the last great planetary opposition nearly three hundred years ago.

And we have been looking backward, in this quiet Martian age. Documentaries abound on the Mars Underground. Our readers delight to bohemian tales of the unparalleled creativity of the Tharsis Uplift. Bar bands maul the old revolutionary songs. Pilgrimages to the Viking Museum at Utopia and the Shrine of the Relic on Olympus even rival ticket sales at Alien Face and its sister parks. For the first time since independence, Founders' names top the list for newborns: delivery rooms from Zubrino to Stanistan are filled with Margaritas and Pennys, Franks and Sams. Hardly a Shabaltana or a Harry to be found, these days.

Yet few parents really expect our children's lives to be as titanic as their namesakes. We Martians have become too parochial, too complacent, to excel. Our arts have become like our children's names, three-times-removed echoes of former glory. Every first-rate performance of the *Lowelliad* could be buried five times over in Alien Face themepark snowglobes. The Jovian moons have long since eclipsed our world as the center of science and innovation. Harmless utopians and Hawaiian-shirted Terran retirees are all that Mars is famous for these days.

And, of course, our fatuous and corrupt politicians. But of that, little more need be said.

How different things were in 2003 (TS), the last time Earth and Mars approached so closely. Then there was no Terran Opposition: no eyes, human or robotic, gazed up from our soil to the sight we greet each evening.

On Earth, the Martian Opposition was no fearsome political movement, but a mild astronomical curiosity. The New York Times marked the event in an editorial that was lovely fluff (http://www.nytimes.com/2003/08/21/opinion/21THU3.html?th), alongside a paean to a neighborhood sports team, reserving the weight of meaning for the day's history-in-the-making. The blue world had no time for Mars: it was struggling with the growing Crisis, the fetal kicking of the coming imperium.

Our Founders' fortunes were again on the wane, at the nadir of another fifteen-year cycle tied to performance of the Terran technological economy. Some had been around since Viking, two cycles ago. Many famous names had come to the cause with the formation of the Mars Underground during the previous conjunction of prosperity and Martian enthusiasm.

The current cycle had peaked several years before, the one marked by Mars Pathfinder and the founding of the Mars Society (this author proudly claims membership in the Spawn of the

Martian Revolution, having inherited a prized three-digit Founding Membership number from a direct ancestor).

After 9/11 and the birth of the Crisis, active interest dropped back to the bottom of the curve, as many became preoccupied by the struggle to survive amidst economic decline, fundamentalist terrorism and the first strikes of the coming planetary Administration.

Through it all, our ancestors struggled on. The Society held a small conference that year (http://www.marssociety.org/news/2003/0822.asp). Factionalism and poverty kept some away who would always rue having missed the first public performance by the only band to build a world, The Extremophiles (http://www.theextremophiles.com). Some waited out the transit of Spirit and Opportunity, whose spectacular success the following year allowed the Founders to begrudgingly unite in support of plans for the Ares Expedition.

The rest is history, Earth's biggest export. History, of which the Founders bore so much together. History, which filled two toxic-waste tanks on the Ares alone, it seems.

Bickering, bloodshed, breakthrough, boomtown - all history now. Revolution, golden age, and gradual, grubby decline - all history, some of our own making, much engineered from the feedstocks so generously provided by the motherworld.

Today, Earth with all its history approaches close, but human progress has long since swept past us in its orbit. Human hopes ride with the Prometheus Expedition to Epsilon Eridani - but Prometheus was a product of the Triton Yards. A century ago, only Deimos's Singer Station could have launched humanity's best work, our brightest dream.

Today, Singer Station boasts no starships, but more retirement-home realtors per cubic kilometer than anywhere else in human space, all looking for the first crack at the tired-but-wealthy teeming masses of Earth's elderly emigrants. It is service of a sort, if not quite glory.

Earth and Mars have come around again, but humanity truly has moved forward. We rightly glorify our Founders, but as revisionist biographies finally have established, they were - mostly - even more cantankerous, single-minded, intolerant and combative than the Crisis-era norm. Still, we doubt that their sex lives were as colorful as Sage Grayson's lustily imaginative novel *Mars Undercovers* portrays them.

Worldbuilders are best observed from the base of their pedestal, long after their flesh has been transmuted into bronze and pigeon droppings. This column has long rued the loss of the pioneering spirit, of revolutionary ardor, of Tharsian heights of creative expression. But can we really imagine sharing a quiet café meal with the inventor of Mars Direct, the commander of the Ares, the architect of Port Heinlein?

Their lives - our history - reads like the stuff of children's adventure yarns. Endless generations of preteens hankering for adventure eagerly gobble Founders' tales, hungry for the addictive thrills of elation and despair. Expert wisdom holds that bloodthirsty pirates, warlords and

prophets are best experienced between covers that can be closed come bedtime, and set aside for good come employment age.

But as we grow, we have been too quick to turn from the terrifying exploits of the Founders to the safe routine of our settled lives, to pooh-pooh the very tales that so thrilled us when our blood still ran rich with hormones. Besides, no matter how old and jaded we may become, this writer will *always* believe in the legend of Saint Christopher and the Rust Rose. Some things, after all, are sacred, some Founders of brighter bronze, even centuries on.

Meanwhile, the Prometheus crew seems as well-adjusted, kind, strong and cheerful as we would expect from carefully-crafted scions of the Outer Marches. No Red-Green split there, no petty demagoguery, no policy-driven weightless fisticuffs on the way to found *their* new world.

But probably, no epic poetry, no grand passion, no divine spark of Dorsa Brevia's political genius, no religious awakening like the First Olympiad. We Martians got the Founders we deserved, and all humanity is better for it.

Even if the Tritonians are too politely proud to take notice. We still do, and their legacy is ours to commemorate and to embody. Tomorrow's Terran Opposition gives us such an opportunity, to look back across the gulfs of space and time at the Old World they left behind in order to build our New World here.

So tomorrow night, step outside and look to the southwest during the timeslip. Feel the tug of history from the motherworld. Then turn your back. Look up, and you may see the fading star of Prometheus on its way. History pulls us back, but humanity pushes on, ever on.

Turn again, and go back inside your bright warm home. Look down on sleeping little Pascal and Kelly. For the Founders' sake and the Republic's glory - and how long since you said that phrase aloud and meant it? - whisper them a tale of Martian greatness - in their generation, and in their time. Help them make some history to ship out to the motherworld and to the stars. What was close once may come around yet again.