

The Tight Stuff

By Alex Burns (alex@disinfo.com), Disinformation®, 1 February 2003.
<http://www.disinfo.com/pages/article/id598/pg1/>

Author's Note: This interview was originally published in 21.C Magazine (2/1997, #23): 52-57. It captures the growth of the private space movement as an American political lobby group, and contains some insights regarding organizational dynamics and lifecycles.

The explosion of the Columbia space shuttle flight STS-107 on 1st February 2003 will trigger a reassessment, despite U.S. President George W. Bush's support, of the American manned space program. The accident, which killed seven astronauts, was the first American case of fatal reentry. It has triggered a massive outpouring of international grief. Analyses and media eulogies have flooded the Internet. The White House has gone into crisis mode. NASA and Congressional investigators are considering several different scenarios for the accident's cause. Three independent boards have already been established. The disaster has grave implications for NASA as it is very likely that the American manned space program will be halted for at least two years and work on the International Space Station may be halted. While the Republican Party has promoted the ISS, the Democrats have preferred a more Earth-focused program.

Will the Columbia disaster spell the end of the space shuttle program? Is this latest disaster, just as America has recovered from 9-11, typical of sociologist Charles Perrow's "normal accidents": technology so complex that risk management and ethical oversight is too difficult?

The Disinformation team sends its condolences to the NASA flight crews and the astronauts' families. This time, sadly, they did not return safely to Earth. It's now up to us to learn from this tragedy, overcome its hazards, and carry forth the Promethean Flame to the universe.

In a gesture which neatly summarized the state of the space race in the late 1990s Coca Cola succeeded in the ultimate product placement on the May 16th, 1996 shuttle launch (Rival Pepsi had to settle instead for Russia's 'Mir' space station). 1996 was the year that the National Aeronautics and Space Administration (NASA) gave way to the privatization of space to combat downsizing and increase profits. The launch of a capitalist icon seemed to accord the ultimate victory in the space race - it also reflected the triumph of free enterprise and competition over government sponsorship. NASA is now entering a new race - to save its very existence.

Faced with the threat of reduced budgets NASA also saw explosive growth in the cheap space-access movement fuelled by the proliferation of private-sector organizations. Straddling SF fandom and commercial aerospace firms, these powerful new groups are invoking the NASA rhetoric of the Apollo space program of the 1960s that succeeded in putting a man on the moon. Now, however, they are talking about putting a man on Mars, and mixed with the ambition is a firm focus on budgeting.

The most effective lobby group to emerge in this free market has been the Washington DC-based National Space Society, with some 27,000 members worldwide. The key to its success is its core of publicly visible members, including Majel Barrett Roddenberry, Newt Gingrich, Freeman Dyson, Marvin Minsky and Buzz Aldrin.

Among the NSS's political successes was the 1991 Launch Services Purchase Act, which requires NASA to hire commercial rockets for all payloads not specifically designed for the space shuttle - a move that helped 1992 commercial space revenues reach US\$4.6 billion, and precipitated the drafting of two bills in Congress: the Space Business Incentives Act and the Omnibus Space Commercialization Act, that are a response to NASA's move to make companies pay for R&D rather than through direct subcontracting. The aim of these bills is to subsidise future research through tax incentives by the major private sector aerospace firms.

"NASA needs a major central objective like it had in the 1960s," believes Dr Robert Zubrin, chairman of the NSS executive committee and an engineer at Martin Marietta Astronautics, a major NASA subcontractor. After President George Bush announced the Space Exploration Initiative (SEI) in 1989 - which proposed a manned Mars mission - Zubrin developed the MarsDirect proposal, cutting the projected program costs from US\$400 billion to US\$40 billion. MarsDirect involves shipping a combined mini-refinery and space ship to Mars, followed later by a crew, a strategy which NASA acknowledges would cut travel to Mars by one-sixth.

Zubrin's political lobbying style can be traced back to the early 1940s influence of SF writers Robert Heinlein, Jack Williamson and Isaac Asimov, as well as to the ultra-Right wing technophiliac stance of Jerry Pournelle who supported President Reagan's Strategic Defence Initiative (SDI, or Star Wars) and increased funding for the military-industrial complex. Using incendiary speeches that attack Malthusian and Social Darwinist ideologies, Zubrin invokes America's pioneering spirit which draws comparisons to the historic Columbus voyages that altered the course of European civilization. His mixture of scientifically precise data and media savvy public relations recalls the work of Princeton University professor Gerald K. O'Neill, who wrote the seminal space colonization book *The High Frontier* (1976), and O'Neill also co-founded the first space colonization advocacy group the L5 Society, which merged with the NSS in 1987.

"What captures public attention is the bold new frontier of space exploration, and the focus of that is Mars," says Martin Thorne, director of the NSS Australian chapter. "The potential discovery of life on Mars has everybody interested, and the next logical Apollo program would be a Mars program that would fire up the public's imagination and capture both the business end of getting such a program up and running, and the public activism to get there. It would require a major commitment from NASA for a manned mission, but all it has planned is robotic probe launches for the next 10 years. Where is the place for humanity in that scenario?"

Danish professor of literature, Claus Jensen, author of *Contest for the Heavens* (New York: Farrar, Straus, Giroux, 1996), aka *No Downlink: A Dramatic Narrative about the Challenger Accident and Our Time*, which dissected the management structures and launch decisions leading to the Challenger disaster, has heard such rhetoric

before. Jensen's book reads like *The Wrong Stuff*, the administrative equivalent to the personality driven Tom Wolfe astronaut bio *The Right Stuff* (New York: Farrar, Straus, and Giroux, 1979).

"The Mars mission was mentioned in the late 1960s at the Lewis Research Center as a natural follow up to the moon landing, but it didn't come into being. Many people within NASA are longing for a great symbolic commitment, but this great technical muscle-flexing won't fly anymore."

Ironically, Jensen believes that the 'right stuff' rhetoric used by Zubrin and other space-commercialization advocates played a major part in NASA's downfall. "There has always been a symbolic side to space exploration, not just hardware, rockets, or space probes. When journalists wrote about NASA, it was like writing about entertainment. It had to provide spectacular events to attract funding.

"NASA had that famous 'can do' spirit and felt that they could do anything. They began to believe their own public relations department - it was a picture created for external use, but it bounced back on them. It was dangerous to believe in this myth."

The death of primary school teacher Christa McAuliffe in the Challenger shuttle explosion highlighted the harsh reality of NASA's vulnerability to its own hype [and communication problems within] and the political expediency which, until recently, motivated much of the space program. NASA had planned to send a seasoned journalist, but President Reagan seized upon the Teachers In Space (TISP) program to defend his record on education issues after scathing criticisms by 1984 Democrat Presidential candidate Walter Mondale. NASA prioritized TISP in hope of another Apollo public-triumph, and to secure future Congressional funding for the space shuttle program, which was under attack from geo-political shifts, population growth fears and a blow out budget. Despite previous delays and concerns by personnel at MTI - the company that produced the defective O-ring in the shuttle which caused its crash - about cold weather, the Challenger launch decision went ahead in order to coincide with a planned televised link between McAuliffe and President Reagan during his 1986 State of the Union speech. In the aftermath, Reagan referred to McAuliffe and the other Challenger crew members as "martyrs sacrificed for exploration's higher cause," while TISP quickly died.

For critics, the Challenger accident serves as a metaphor for the complex political forces that surround NASA. Jensen believes that the late physicist Richard P. Feynmann's role in the Rogers Commission into the Challenger explosion also became politically motivated: "[Feynmann] wanted NASA and the president to learn a lesson, and was very much troubled by the propensity to contain this story and make it just a malfunction in the space shuttle; not seeing the wider context that could make it happen again under different circumstances, or even within another organization."

After intensively studying the political fallout from the Challenger disaster, Jensen also supports current NASA policy that favours robotic probes. "The decision for another manned program must be based on a rational estimation of the program's safety compared to less costly, unmanned alternatives."

Like many advocates of the commercialization of space, Jensen believes that NASA is dead, but for different reasons. "NASA is now a dinosaur - its brain and response patterns once fitted in perfectly with its surroundings, but these faculties are out of place in a giant organization created in another time for another purpose. The space shuttle was a means to a purpose, not an end. Now NASA has to continually create new goals and purposes to stay in existence."

Jensen suggests that the cause of NASA's troubles is more fundamental than public relations problems or technical difficulties, evinced in the 1986 Challenger shuttle disaster or the May 1990 Hubble Telescope debacle. "NASA has largely been reliant on the US domestic political environment from its founding during the Eisenhower Administration," he states. "When the space race between America and the Soviet Union collapsed, of course NASA got into trouble!"

Alongside political expediency, NASA has come under attack for its poor communication within its own ranks. The behemoth has branches all over the US and as the Challenger disaster proved, NASA suffers from bureaucratic gridlock.

"NASA had a complex organizational structure and 10,000 subcontractors at the time of the Challenger disaster," says Jensen. "The more complex it gets, the more risky. It becomes even more complex with more contracting out of NASA's work or internationally developed systems."

Future manned missions will have to overcome the "Challenger syndrome," Jensen's label for NASA's subsequent bureaucratic gridlock, which he compares to the 1986 Chernobyl and 1979 Three Mile Island nuclear plant meltdowns, and the 1986 Union Carbide disaster in Bhopal, India. "Systems analyst Charles Perrow has termed these incidents 'normal accidents' - complex factors interact in an unexpected fashion, and no one is really able to see through it at all. These hi-tech accidents may not have any clear cut causes at all, but may be inherent in the complex technological systems we have created, encoded within the organizational power structure itself. As long as we see organizational failures as simply the result of amoral individual actions in the 'chain of command,' our strategies for control will be ineffective, and dangerously so."

"This accident was not a result of decisions by amorally calculating managers. Instead, it was a normal accident, an almost inevitable organizational mistake, the kind of mistake that happens when large complex systems deal with tricky technologies. That is not reassuring, as these complex systems have invaded most aspects of our modern reality."

The shock resignation of space shuttle director Bryan O'Connor in March 1996 supports Jensen's analysis of the politics in space control. O'Connor publicly criticised NASA Administrator Dan Goldin's plan to shift control of the shuttle program from NASA's Washington HQ to the Johnson Space Center, fearing the change could jeopardize future shuttle safety.

Under Goldin's proposal, the Houston-based Johnson Space Center would control shuttle programs at the Stennis Space Center in Mississippi, the Marshall Space Flight Center in Huntsville, Alabama, and the Kennedy Space Center in Florida. O'Connor felt that this restructuring would encourage dangerous rivalries between the centers

and create barriers to effective communication, making a future Challenger disaster more likely to occur. And it was issues of communication that the Rogers Commission and NASA internal studies warned against.

"Inevitably these funding cuts create a lot of inter-center rivalry," Jensen comments. "The centers are communicating tactically to survive the recession. In the 1960s each center fought for lucrative supply contracts, now they are fighting for their very survival.

"The NASA centers were created in a unique political and economic environment - part of a Cold War rivalry with the Soviet Union. The 1960s was a completely different political climate - NASA was beyond criticism thanks to Kennedy's presidential backing. He protected them throughout the Congress. Nobody could say anything against them, but neither did they want to. The US when Lyndon B. Johnson was president was different; you largely had an anti-technological movement spawned by the Vietnam War, student riots and inner city ghettos. Many people felt they could use the funds on Earth and not on a manned Mars mission. NASA from that time on had to be nosediving; because the culmination had been there, the public saw no reason for them to press on."

Yet despite the sceptics, the support for space programs is vast enough to generate billion-dollar commercial packages in an extremely risky endeavour. What they hope to receive for their investments ranges from faster transportation to environmental solutions.

"Initial pay-offs for the public, even without a manned Mars mission," says Martin Thorne, "include a high-end courier service around the world, flying to London in record time, joy flights into the upper atmosphere or even a holiday in space within the next 10 years."

Thorne also mentions environmental and industry saving factors as justification of the space program. "Once a payload is out of Earth's orbit, it's easier to go onto Mars than the Moon, and even easier to go onto the Asteroid Belt than Mars. That's where the major pay-offs in raw materials for the next century are."

In support of this view, John S. Lewis, professor of Planetary Sciences and Co-director of the Space Engineering Research Center at the University of Arizona-Tucson writes in *Mining The Sky: Untold Riches from the Asteroids, Comets, and Planets* (New York: Addison-Wesley Publishing, 1996) that "while we humans worry over the depletion of the Earth's natural resources and the pollution of our planet, uncountable dollars worth of metals, fuels, and life-sustaining substances await us in nearby space." Lewis suggests that the technology to harness these resources are already in our grasp, and that we could already mine the Apollo and Amor asteroids that inhabit our immediate neighbourhood without having to travel to the main asteroid-belt between Mars and Jupiter. The Apollo and Amor groups feature the common 'carbonaceous chondrites' asteroid type, which are rich sources of silicates, water, carbon and nitrogen - precious materials to humans not just on Earth, but also if we are to colonize outer space."

A more 'down to Earth' environmental proposal for the use of the space program was astronaut Sally K. Ride's recommendation to the Rogers Commission that NASA abandon the manned Mars mission and other 'space frontier' plans and instead monitor the Earth's biosphere from a new satellite network. Under media pressure, and in need of a new 'socially conscious' public relations facelift, NASA administrator James Fletcher released the proposal without official endorsement. 'Mission to Planet Earth' received glowing praise from feminist and environmental activists, but a disillusioned Ride had already resigned from the astronaut corps.

During their successful 1996 presidential re-election campaign, the Democrats elevated this proposal to a funding priority at the expense of traditional aerospace programs that had flourished under the Reagan/Bush era.

"[NASA] had a better relationship to the Republican Party; President Bush pushed very hard for the Freedom space station, and while Clinton has made some remarks in that direction, he has never pursued it intensively under his administration," remarked Jensen. "Goldin has had his back against the wall, and had difficulty in getting funds for a planned Mars mission and Freedom space station."

NASA Administrator Dan Goldin continues to promote programs such as the Lunar Prospector and Stardust missions despite severe funding cuts from the US Congress. The 1996 NASA annual budget was US\$14 billion, which fell to US\$13.8 billion in 1997, and was projected to fall to US\$11.6 billion in 1999, in contrast with the original SEI estimates of an annual US\$25-40 billion. Having already cut 25,000 jobs, with another 30,000 targeted, Goldin hopes that his relentless push for small robotic probes will force NASA centers to fast-track organizational restructuring and increase program efficiency. His master-work is the Origins program which will study planets within 100 light years of Earth to understand how the universe formed and whether life is unique to our planet. Goldin hopes that Origins, which has virtually no budget, will become as well known as the Apollo and space shuttle projects, re-igniting public interest and countering the Clinton White House budget cuts.

But as the 1996 elections attested, NASA and space exploration are not key issues in US politics. If anything, the Democrats are devoting less money to space research. Despite strong support from competing presidential candidates Pat Buchanan and Alan Keyes, who both stressed the need for halting bureaucratic expansion whilst increasing future manned missions, former Senator Robert Dole (R-Ark.) didn't make the future of NASA and space commercialization a major issue during his unsuccessful 1996 presidential campaign.

Newt Gingrich also called for a "major government focus to help reduce the cost of payload lift," and has encouraged the adoption of a prize system to encourage private sector firms to finance cheap launch systems. Entrepreneur Dr Peter Diamandis founded the X PRIZE Foundation in 1993 for this purpose, attracting widespread support from commercial space advocates. Diamandis has drawn an analogy to the Orteig Prize awarded to Charles Lindbergh for the first non-stop flight from New York to Paris.

Both politicians and space commercialization advocates agree that the major priority is the continued funding of single-stage-to-orbit (SSTO) and reusable launch vehicle (RLV) programs, dominated by the Rockwell International and Lockheed Martin aerospace firms. "One of the goals of the NSS is to lower the costs of getting a payload into orbit, and enable new opportunities to open up, allowing others to innovate," believes Thorne. "There is certainly a place for both government and industry. But in the long run, industry has to pick up where the government leaves off, and has to turn R&D into real profit dollars that are going to benefit the citizen in the street." Industry funding of organizations such as the moonbase oriented Artemis Project show that the resurgence in space commercialization has been prompted by a budget restricted government that Thorne suggests "is promoting the private sector to pick up the tab on the new generation of RLVs, space development, and satellite launches. These can be a profitable business. Certainly the insurance business turns a healthy profit in insuring launches." When NASA launched a satellite for major firms like RCA, it invoiced them whether or not the launch was a success and left the insurance companies to replace the lost satellite. Post-1998 liability changes, however, have significantly altered the profitability situation.

The X-33 and X-34 RLV programs may have received priority funding, but Lawrence Barr Crowell of NASA's Breakthrough Propulsion Physics (BPP) steering group has a more long-range outlook. "There is a lure to the idea of warp drives and non-rocket propulsion. Having worked on space mission planning I must confess I see a dim future for manned space flight. The shuttle is becoming aged and the only plausible replacement is the Delta Clipper being tested at Alamogordo. With the current launch vehicle technology the International Space Station is outrageously expensive. Given the fickle voting of the public and the equally fickle nature of Congress, I give a 50 per cent chance that about half of this will be deployed in space before Congress axes it. That is if a shuttle catastrophe doesn't occur. I have seen several Atlas-Centaur, Delta rocket, and two shuttle launches. They are impressive, but it's very inefficient.

"Nuclear propulsion, at least nuclear powered launch vehicles, are probably out of the question. A combination Challenger-plus-Chernobyl disaster would kill all hopes. I would not want to be the program manager of the system after such a disaster!

"Warp drives have some degree of physical validity to them, if the energy conditions imposed by Hawking and Penrose are violated and cosmic censorship is not a sufficient condition in general relativity. Only time will tell."

Despite funding cutbacks, BPP co-founder Al Holt continues to spearhead research into new launch system paradigms. "A reduction or biasing of the effects of gravitational fields would be a logical and perhaps easier first step, but we are looking for 'warp drive' approaches also in parallel. The BPP steering group is interested in funding both sub-light and faster-than-light research paths. A breakthrough development in 'warp drive' physics should also have some application to sub-light propulsion and transport."

Gene Roddenberry's libertarian Star Trek utopia may have created unrealistic public expectations for manned space exploration, and NASA may be politically dead, but the NSS and the wider space commercialization movement will ensure that the future will be as interesting as it is unpredictable.