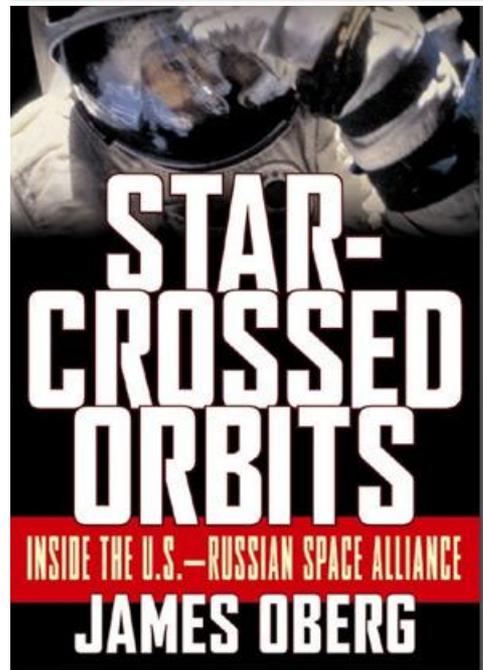


# *Strategies For Mars Mission International Cooperation - Past Lessons versus Past Delusions*

**The 17th Annual International Mars  
Society Convention  
August 10, 2014**



*“Before you run in double harness,  
look well to the other horse.”*

Attributed to Ovid, Roman poet, 43 BC – 17 AD

Author of “Metamorphoses”

**“It ain’t what you don’t know what makes you look  
like a fool, it’s what you do know what ain’t so.”**

**Will Rogers, American humorist [1879-1935]**

# Strategic options

- We've tried them all
- No one size "fits all"
- Unilateral, bilateral, multilateral, you name it
- Cultural context determines current choice
- Frequent confusion of ends and means:
  - Does cooperation foster mission success?
  - Does the mission foster wider cooperation?
- Focus on your goal! Be aware of changed context!

Recent US-Russian tension over Crimea shook foundations of ISS partnership

What does it mean “on foot”.  
Houston? What sort of  
damned sanctions?

ЧТО ЗНАЧИТ  
ПЕШКОМ,  
ХЬЮСТОН?  
КАКИЕ ЕЩЁ  
К ЧЁРТУ САНКЦИИ?!!



# But ISS partnership survives

- Broken initial [~1993] promises – every one
- Unexpected benefits – pleasant surprises
- MUTUAL co-dependence – if reluctant
- Neither major player has realistic alternatives
- Relevance to FUTURE international projects:
  - Not clear
  - Wrapped in myth
  - Needs more cold-blooded analysis

# Approach

- Initial human spaceflight cooperation
- Rise of mythological cause-and-effect
- Shuttle-Mir
- Russian invitation into ISS
- Original motivations – entirely delusional
- Negative impact on NASA ‘safety culture’
- Actual results – surprisingly robust
- Current/future options
- “Cynical optimism” through realism

# Remarks Delivered at the James Baker Institute for Public Affairs,

Rice University, Houston, Texas, November 11, 1999

- When the Russians were invited to join the space station program in 1993, NASA had made a number of promises.
- 1. It would save time and money, and in fact would probably save the program from political cancellation;
- 2. It would allow American space engineers to learn from Russia's decades of experience with space station, and hence avoid past mistakes and make future hardware and operations more efficient than ever;
- 3. It would prop up the Russian space industry so it would not out of desperation sell services and technical secrets to "rogue states" building their own missiles to threaten the US and its allies;
- 4. It would symbolize the total reversal of the "Cold War" confrontation between Moscow and Washington, and would strengthen reformists within Russia to bring their society into the Western format;
- 5. It would foster the growth of mutual trust and respect, and influence American popular culture into a more mellow view of Russia;
- 6. It would inspire even grander and deeper cooperative projects between Russia and the US for the benefit of the whole planet.

# Does space cooperation spill over onto Earth?

- One of the most persistent and pernicious mythical benefits of international space partnerships is that it promotes peace on Earth.
- That is, embarking on a complex and expensive joint space project actually tames the governments of unfriendly nations.
- In practice, experience shows that joint space projects actually follow — rather than cause — relaxations of tensions.
- They are often performed to illustrate the new and improved diplomatic climate.
- A rooster may think its crowing brings the sunrise, or a robin that its singing brings the spring, but their performance is the consequence of a larger phenomenon, and not the cause.
- The same goes for the bird's fellow fliers in the astronaut and cosmonaut corps.

# Apollo-Soyuz: Blurring of diplomatic context

- Vance Brand [2005] delicately described the cautious first meetings when “we’d all heard a lot of bad things about the other country”.
- Tom Stafford reduced the conflict between the free nations of the West and the totalitarian regimes of the Soviet bloc as **“two superpowers with a somewhat adversarial relationship.”**
- Official NASA history of the 1995–1997 Shuttle-Mir program (written by an astronaut’s spouse, not a real historian) explained how the Cold War began with the US and the USSR becoming “competitors in many areas”. It then developed into **“a situation similar to Shakespeare’s Romeo and Juliet with its ‘two households, both alike in dignity’ yet sharing an ‘ancient grudge’...”**
- NASA’s chief astronaut during the Shuttle-Mir program in the mid-1990s, Charles Precourt, about the practical benefit of space friendship. It will **“provide the psychological impetus for politicians to force themselves to find an agreement to disputes that otherwise they wouldn’t.”**
- This will happen, he believes, “because they’ll look up there and say, ‘Well, we have an investment in that, too. **We have to keep this relationship going in a proper direction,’ rather than doing something rash.”**

This “moral equivalence” is bad history and worse, is self-deceptive faux-idealism

# Top managers expect to save the world

- NASA Administrator Dan Goldin: “Instead of pointing missiles at each other, instead of competing with each other, we learn from each other,” he boasted. “I’ve seen a change, not just in the Russians but in the Americans,” he continued. [Reality: USSR collapsed]
- “There was stress between our people, there wasn’t trust.” Then, thanks to joint activities over the past decade, things changed and mutual trust developed. “This trust is very important to do things. This trust is also a good sign for the future of the world.”
- Dieter Andreson, senior space station manager for the European Space Agency: “There will never be strong conflicts between countries involved in the space station as long as we have astronauts for each others’ countries on the outpost. That is one of my beliefs. And if it proves to be true, then it justifies not only the Russian delays in the program but the tremendous amount of investment the world is making in that bird.”

# Notion: ISS means no more independent space programs

- As a result, if there is a philosophical theme to the ISS project today, it is that its success means the end of all major national space activities in the future.
- In this view, when it comes to manned flight to the Moon or Mars, there should be no option for a purely U.S. project or for a U.S. project with traditional space allies. If the Russians aren't involved, the project should never occur.
- “What’s really important is how we’re doing it,” exulted author Brian Burrough (“Dragonfly”) in a celebratory op ed on the occasion of the launch of Expedition-1 [Nov 2000].
- **“This is humankind’s station.. . . It’s a real-life step toward a Star Trek universe, the first foray into The Federation.”**

# Passion for Permanent Partnership

Bob Cabana, the astronaut who commanded the first space station assembly mission in December 1998, voiced an almost theological passion for a permanent space partnership in a radio debate with me in mid-2000.

“When we leave low Earth orbit, it’s not any one country’s responsibility, **we need to do this united,**” he insisted.

“If we can learn to work together 200 miles above Earth, in the vacuum of space, and pull this project off, we can do anything.”

“And I think **we're setting the stage for the future,** and it would've been **really wrong** to do it without the Russians, without one of the major spacefaring nations of the world.”

[of course the Russians agree – otherwise, be left behind]

# Astronaut enthusiasm

- At a prelaunch press conference at Baykonur, shuttle-Mir veteran astronaut Michael Foale asserted that “the model for space exploration is international cooperation.”
- His strategy: **“This flight is the keystone to all future exploration from this planet—to the Moon, to Mars and asteroids.”**
- Former astronaut Mike Baker, later a NASA official, agreed: **“From now on, I think that all of our endeavors in space, human endeavors, will be joint.”**
- John Fabian, speaking before the House Science Committee in October 1993, voiced the same thought: “We are in a unique position to globalize human endeavor in space.... Cooperating with Russia gives the United States the opportunity to develop interdependent relationships.”

# Cosmonauts & diplomats agreed

.Yuriy Malenchenko stated. “This is how we in the Russian cosmonaut corps view the International Space Station: as a bridge to an international expedition to either the Moon or Mars.”

The U.S. State Department spokesman in Moscow, Nicholas Burns, told Interfax on August 7, 1998, “Our future in space is one of partnership with Russia. We have given up the space race, we have given up competition, and we’re working together. . . . In the Cold War, we tried to compete with Russia. Now we try to put our efforts together, and that’s a much better way of proceeding.”

# Utilizing delusion as foundation always ends in tears

- This “moral equivalence” is bad history and worse, is self-deceptive faux-idealism
- Nations do spaceflight mainly for self-serving goals that include technology, science, self-enthusiasm, prestige, and ‘street cred’
- Success of Apollo established credibility of American technological superiority that enhanced credibility of Reagan’s Strategic Defense Initiative and probably accelerated the collapse of the Soviet Union and communism

# Late 1990s -- Losing focus

- Changing the fundamental goal of spaceflight blurred the all-too-necessary fanatic focus on flight safety
- Projects were selected and expanded [eg, Shuttle-Mir] not for practical value but for the example they could set to the world
- Symbolism came to dominate substance in many minds, most dangerously among NASA managers.

# 1997: Willful NASA blindness to unseen hazards

- NASA HQ memo dated April 18, 1997, stated: “No new risks have been identified, and no problems are foreseen.”
- NASA operations lead in Moscow on *Mir*'s health: “Everything looks good. The systems are gradually being restored to more acceptable performance levels. It looks like we've gone through the darkest part and we're headed toward the light.”
- May 26, 1997, after Jerry Linenger returned from *Mir*, the NASA associate administrator for plans, gave the party line: “We feel a degree of confidence that we have overcome these problems. We are very confident we are operating in a safe manner.”
- Michael Foale was already aboard *Mir* at that point. Asked about the safety of *Mir*, he had replied, “I'm not worried about it. The safety is perfectly assured.”
- Progress-M collision caused by poor planning, superficial hazard assessment, and inadequate training was about to nearly kill everyone on board.

# Shuttle-Mir post-disasters responses

- In August 1997, astronaut Wendy Lawrence, then still a candidate for a lengthy Mir mission, explained to a television reporter why she was not worried by the string of space calamities. **"I figure that everything that can go wrong has already gone wrong,"** she quipped.
- If that was her true view, she should have been fired.
- In September 1997 James van Laak told the New Yorker's Peter Maas: "To be perfectly honest, there are plenty of people within the political system and within NASA who are pushing us to go, go, go, go, while at the same time, they are distancing themselves from any blame."

# NASA: abandoning Mir would show US was “chicken”

- September 10, 1997, considering the launch of the next astronaut to Mir. Pete Rutledge, executive secretary of a NASA safety panel, presented the chart that spelled out the panel’s position.
- **“Despite concerns,” the chart said, “there is no hard evidence that Mir is currently unsafe.”**
- “If and when Mir is deemed unsafe for a U.S. presence,” the chart said, “NASA should convince our Russian partners that Mir is unsafe for a continued human presence and press for abandoning the vehicle completely.”
- In English: If Russians stay, our manhood demands we stay too. It was a macho thing: If the Russians wouldn’t quit, we wouldn’t either.

# Fundamental reversal of NASA safety principle #1

- **“Despite concerns, there is no hard evidence that Mir is currently unsafe.”**
- **PREVIOUS NASA SAFETY POLICY WAS TO ASSUME SPACEFLIGHT WAS UNSAFE UNTIL RIGOROUS CHECKS SHOWED THAT ALL HAZARDS WERE IDENTIFIED AND MINIMIZED.**
- NASA spokeswoman Peggy Wilhide was upside down, challenging doubters to find reasons not to go. “The bottom line was that the experts that we had asked, the majority of them, determined that there were no technical or safety reasons to discontinue the program,” she told Associated Press.
- **Assuming flight was safe until contrary evidence proved a danger existed was the philosophical flaw that had killed the Challenger crew in 1986; repeating that same flaw would kill the Columbia crew in 2002. Wilhide [a former Al Gore staffer on loan to NASA] was a perfect example of it.**

# Skeptical realists – Gene Kranz [Feb 2001]

- “The space station's current problems and cost overruns do not reflect a failure of NASA technical management, but a failure of political leadership. NASA's problems with the space station for the better part of the last decade are the responsibility of Daniel Goldin and the questionable top-level leadership he selected during the re-baselining and initial design of the international space station (ISS).
- “The costs faced by ISS program management in the year 2001 are the direct result of the technically and politically inept decisions in re-baselining the program in 1993–1994. Goldin embraced the Gore-Chernomyrdin initiatives and drove to establish Russia as a partner in the space station program, ignoring the technical and economic consequences of his act in a successful gambit to save his own job.”
- Kranz described the decisions that were made over his own objections, objections that led to his sudden departure from NASA: “Russia was subsequently assigned partnership responsibilities for critical in-line tasks with minimal concern for the political and technical difficulties as well as the cost and schedule risks. This was the first time in the history of manned space flight that NASA assigned critical path, in-line tasks with little or no backup.”
- Kranz [and JSC Director Aaron Cohen] went into ‘early retirement’ in 1994

# Kranz pinpoints improper priorities

- Kranz wrote that Goldin knew that all of his experienced technical managers were against the policy, so, Kranz continued, “he bypassed them and established a redesign team headed by astronauts Bryan O'Connor and Bill Shepherd—neither of whom had relevant program management experience. As a result, the team he formed was inexperienced in program management, design requirements, systems and operations integration, and cost assessment.”
- The results were as Kranz and his colleagues had warned. “Today's problems with the space station are the product **of a program driven by an overriding political objective** and developed by an ad hoc committee, which bypassed NASA's proven management and engineering teams,” he concluded.
- Kranz’s warning that politics had diverted NASA’s focus away from traditional NASA priorities such as flight safety came two years **BEFORE** the Columbia shuttle catastrophe.

# Did “internationalizing” ISS fulfil all the promises at reasonable cost?

- Traditional partners performed magnificently
  - Canada, ESA, Japan, other nations
- Russians were brought on board on White House initiative for post-Soviet diplomacy
- Was that successful in meeting original goals?

# Russian participation did not make ISS capabilities any "better."

- All the revolutionary features that differentiate the International Space Station from every previous orbital outpost — Skylab, Salyut, Mir — were invented by the American side. These included :
- Reprogrammable laptop-controllers for changing equipment configurations [replacing banks of switches]
- Modular assembly/rearrangement with common berthing mechanism
- massive power and thermal control systems,
- high-speed communications links that enabled ground scientists to directly operate on board equipment,
- [doorways that were big enough](#) to permit the transfer of refrigerator-sized equipment modules into the station and between the modules.
- Sample & food cryogenic stowage
- Crew systems [exercise, toilet, etc]
- CANADIAN contribution of cargo handling robotics

# Launch Costs of Russian ISS partnership

- In order to reach a compatible orbit to build the station, space shuttles had to steer so far northward from Florida that they lost up to a third of their cargo-carrying capacity.
- This required many extra flights — at well over half a billion dollars apiece — to carry hardware that could have been stowed aboard shuttles heading toward the originally planned orbit.
- At shuttle liftoff, Russian-accessible also required a more severe atmospheric climb that put added stress on the shuttle thermal protection system.

# Failed promise: constrain brain drain

- Hundreds of millions of dollars sent to Russia was supposed to prevent a flood of unemployed rocket scientists from seeking work overseas for "rogue state" missile programs.
- But the people who got the money weren't missile builders at all, they were space vehicle designers and operators.
- By the time the money began to arrive, real Russian missile builders had already been laid off by hundreds of thousands.
- There were always more than enough unemployed Russian rocketeers for hire overseas, and they had no trouble "following the money." Adding US money had no effect,
- Russian government constraints were 'pro forma'
- The ultimate 'rogue state' limitation was in the budgets and domestic industry of those would-be missile nations.

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If there is one semi-theoretical "rogue state" that has actually benefitted enormously from the space partnership, it is the still-hypothetical future anti-Western Russia.

Western money has quite literally saved the Russian space industry and infrastructure from total collapse.

At the Baykonur launch site, Western money upgraded the airports, payload processing facilities, communications links, and other high-tech facilities, all ostensibly to allow the safer and more efficient processing of Western payloads, but all equally applicable to current and future Russian military space activities as well.

NASA has equipped Russia's "Mission Control Center" with a vast array of modern computers.

Similar investments in Russian rocket and spacecraft factories, and careless transfers of American hardware and software, has guaranteed that whatever space goals a future Russia chooses to pursue, it will have vastly enhanced capabilities, thanks to the West.

<http://www.jamesoberg.com/partner.html>

## BUT: Surprising benefits of having the Russians on ISS

- There are several important justifications that were not expected, but which made the game worthwhile.
- Money saved by NOT having them along would have allowed creation of Western replacements but of unknown reliability
- Russia accidentally added key redundancies
- Don't count on always being so lucky

# The “kluge” reward

- Probably the biggest and happiest hardware-related surprise of the space station is how the patched-together design — a Russian segment at one end, a swiftly expanding U.S. segment at the other — has offered unexpectedly strong robustness.
- It may look like a classic engineering “kluge,” and the interfaces may have been lashed together with inelegant rigging.
- But when push came to shove, boy, did it ever hold together. In the face of failure of systems from either country, the other country's equipment could and did stand in.
- The “lesson learned” design philosophy here is *not* to build one integrated vehicle comprising components from a dozen sources. It's to create a system from separately developed space vehicles, bundled and cross-connected but still vastly different in their engineering cultures.
- It has [worked for the International Space Station](#), and it can work for future big projects.

# Transparency

- The second theme is "transparency," which the new strategy wisely highlights as an important by-product of international cooperation.
- Intimate insight into the aerospace industries of other nations is a fundamental requirement of big space projects.
- This has forestalled potential diplomatic clashes over independent space operations that were often misinterpreted, sometimes naively and sometimes for propaganda purposes.

# Demonstration of trustworthiness

- The space station partnership did not play a measurable role in international diplomacy, but it provided a useful impetus in each partner's domestic political process.
- During periods of budget crisis, when local stresses threatened cutbacks or cancellation of each country's contributions, their arguments to their fellow countrymen referenced their commitment to be reliable international partners.
- To some degree it was merely prestige, but being known as a reliable high-tech player on the world stage also provides profound commercial and military status.
- The opposite is also true. Dropping OUT of a previous commitment can have a negative ripple effect.

# Loss of 'secrets'

- Concerns over technology flow are genuine and prudent
- Historically, most 'secrets' obtained through US-Russian cooperation were that previous assessments were erroneous, sometimes dangerously so.
- External "mirror-imaging" of each other's programs often led to dangerous ideas

# Retrospection – Russians on ISS

- The surprisingly heart-warming result is that for this project, the internationalist choice — including the Russian role — was the correct one, but for all the wrong reasons. This time, the United States was lucky.
- For other projects now under consideration, the "right reasons" must be understood from the beginning, and not just turn up by good fortune and dumb luck.
- The Russian space alliance didn't make the project faster or cheaper, as was promised when the alliance was forged in 1993.
- Experience verified what spaceflight guru Norm Augustine observed at the beginning: "I have yet to see a joint international program that saves any money."

# White House space policy - 2010

The White House policy paper prominently **lists expansion of international cooperation as one of the top goals** of the U.S. space program. Such cooperation has proven useful in the past. **But expanding cooperation merely for the sake of cooperating, as a goal in itself rather than a means toward a goal, can become an empty (but potentially costly) gesture.**

The [specific] goals described in the White House report appear more realistic and reassuring. The three main aims are

- to strengthen U.S. space leadership,
- identify candidate projects that would benefit from international partners,
- and dispel misconceptions around the world about U.S. intentions in space through greater transparency and confidence-building measures.

These seem to be reasonable and valuable efforts.

# Words of wisdom

- “We should be careful to get out of an experience only the wisdom that is in it—and stop there; lest we be like the cat that sits down on a hot stove-lid. She will never sit on a hot stove-lid again—and that is well; but also she will never sit down on a cold one anymore.” -- Mark Twain
- “You will find that the truth is often unpopular and the contest between agreeable fancy and disagreeable fact is unequal. For, in the vernacular, we Americans are suckers for good news.” -- Adlai Stevenson, commencement speech at Michigan State, June 8, 1958