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WHY WE DO -- AND MUST -- GO INTO SPACE

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The short answer -- more than three decades after Apollo 11 landed on the Moon -- to why we go into Space is "we must."

Those who say that manned space flight is "a bust," or "unnecessary," are depressingly shortsighted. They miss the whole point. We send people into orbit because orbit is the first step to getting anywhere -- and everywhere -- else. And that, as every schoolkid knows, is the true purpose of spaceflight: to send people elsewhere, to have people living and working in space, to create new homes for humanity.

Why is that important?

History teaches, over and over, that societies that have pushed their frontiers have prospered; those that have not have withered. Space is the next frontier, of both geography and technology. No society has ever gone wrong betting on the frontier. This nation was invigorated spiritually, and prospered economically, by challenging and finding new uses for one frontier after another. Our massive subsidies of roads, railroads, air travel, and other technology in order to exploit them were amply rewarded.

In the process of settling space we will learn, among other things, to manage and sustain closed ecosystems. That knowledge alone could eventually transform and maintain the Earth as a natural habitat for all species, with an indefinitely sustainable economy based on complete recycling of products and renewable energy resources.

Eventually off-world settlements will also provide a reservoir of civilization and terrestrial life, including vital food plant species and varieties, that no single planet-wide catastrophe can destroy, whether of natural origin as asteroid strikes or volcanic upheavals or pestilence, or of human miscalculation as nuclear or biological war or experimentation.

Undiscovered asteroids and comets cross Earth's orbit every year, some, like the one that struck Jupiter a few years ago, with the potential to cause planet-wide upheavals. Detection and deflection of such threats may very well depend on our having, in place, the capability of sending humans out to them on short notice. Likewise, exploitation of limitless solar power (reducing our need to use forests and oil and coal merely for fuel and eliminating the pollution they cause) may depend on our building large structures in space. But learning to build in space is a process with a long lead time; to have those capabilities ready when we need them, we need to start now.

A more nationalistic reason: leadership in Space does translate to influence on Earth. First with Sputnik and then with the U.S. Echo balloon and the Soviet Mir space station, we

learned how much Earthbound watchers developed awe, respect and then deference to the nation whose tangible symbol flashed by overhead. There is good reason why the space shuttle has been a worldwide symbol of America.

Some argue that manned space travel is prohibitively expensive and thus should be curtailed until there is "a breakthrough in propulsion" or "a cost-effective way to get people into orbit." The fallacy there is that science develops mostly by increments, not by breakthroughs. We could not have developed the DC-3 without first making bi-planes, and we could not have developed 747s without first building DC-3s. Centuries ago these critics' predecessors would have told people not to cross the Atlantic in those tiny, fragile wooden caravels, but to wait until speedy steam ocean liners were developed, and besides, there's no use is there in traveling all that risky way to a new continent that was only wilderness.

Nor is space flight "too dangerous." People die every day in commonplace cars. Brave and skilled workers die in every great construction project; giant buildings and bridges even have a "death budget" built in, because accidents do happen. Thousands died in those caravels and in their covered wagons making the trek across the American continent. But they paved the way for the rest of us. When lightning strikes, we do not scurry back into our caves like Neanderthals; we build lightning rods!

It has been argued that, even if we did not intend to settle space, machines can do everything in space that humans can. Not so.

The true legacy of the human space program has been the thousands of engineers, scientists, and technicians who were inspired to stay in school and achieve. These are the high-tech dynamos that have driven our technology economy. So, too, will the challenge of space continue to inspire and drive the next generation. Meeting these challenges will force us to stretch our technology, prove our talent, advance our science, and, as with every frontier, evolve new ways of thinking and living together. No other focused effort promises so much benefit.

Robots lack flexibility. People are needed to build, maintain, fix the machinery -- from Hubble-like telescopes to small lab equipment to the robots themselves. As we haven't yet created fully automated, self-repairing machines on Earth, we surely cannot rely on them in space. Likewise, people will be needed on the spot to conduct much of the research in space, to look at what is happening and make those adjustments that are immediately necessary or unexpectedly promising. If robots could replace humans in our laboratories, all the laboratories on Earth would not still be staffed by people.

What we have learned about the human body in space -- where physical disabilities of aging, bone and muscle deterioration occur quickly -- promises to benefit every human on Earth. We can't learn more without having real people up there for long periods.

Space also provides a locale for conducting potentially hazardous technological and biological research, helping protect the Earth and its biosphere.

It is a myth that "we can't afford Space." Confirmation that "Space pays" may be found,

for example, in the 1989 Chapman Research report, which examined just 259 *non-space* applications of NASA technology during just 8 years, 1976-1984, and found more than:

- \$21.6 billion in sales and benefits,
- 352,000 (mostly skilled) jobs created or saved,
- \$355 million in federal corporate income taxes.

Other benefits, not quantified in the study, included: state corporate income taxes, individual personal income taxes (federal and state) paid by those 352,000 workers, and uncalculable benefits resulting from lives saved and an improved quality of life. The 259 applications represented *only about 1%* of an estimated 25-30,000 Space program spinoffs. The benefits were *in addition to* benefits in the Space industry itself and *in addition to* the ordinary multiplied effects of any government spending.

Critics also argue erroneously that "almost all the payoff from space travel . . . has come from unmanned vehicles and satellites." The fact is that most of the advanced technology would not have been developed except to preserve priceless human cargo. Then, after building these manned spaceships, scientists and engineers looked at the thousands of specialized small parts they created and then found new on-Earth uses for them, creating hundreds of new industries that would not have existed but for the focused goal of manned space exploration. Spending on human space activities has for decades been the "seed corn" for our economic development; it makes no sense to stop doing what has rewarded us so well and promises so much more.

If we ask, "Can we afford Space?" we now know the answer is yes. To the better questions, "Can we afford not to invest in Space? Can we afford not to go?" the answers are no.

In summary, the ultimate purpose of going into Space is to live and work there -- just as the ultimate purpose of exploring the New World was colonization -- and not merely to sit back on Earth and cogitate about what automated spacecraft report back. We do not send our cameras to the Grand Canyon; we go ourselves. We sent Lewis and Clark not just to describe the American West, but to learn where and how people could live there. America grew by sending out seeds in different places and then filling in the spaces with trade and industry and new ideas. People have always found ways to prosper from their environments, however harsh, and we will do so on other worlds. We cannot begin to live and work in Space without first going there. And, it is human destiny to escape the cradle of our planet of birth.

Whatever his original motives, Pres. John F. Kennedy ultimately will be most remembered for setting this nation on the road to Space. That vision was his legacy to the following generations. We should be building on that legacy by re-launching America's space program with bold ventures to send many more humans to orbit -- and beyond. We need a space program that goes somewhere!