

ROCKETEERS

How a Visionary Band of Business Leaders, Engineers and Pilots is Boldly Privatizing Space

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The X-Prize Concept

The foundations of what is today the multi-billion-dollar commercial aviation industry were never laid by government funding or by a tightly coordinated research and development program. Instead, a group of tinkerers, garage inventors and part-timers responded to a series of cash prizes which were offered by some of the premier institutions and individuals of that era. Some of these prizes were small and obscure while others garnered huge public interest –

- 10,000 French francs for whoever could accomplish fifteen minutes of sustained flight.
- 10,000 British pounds for the first nonstop transatlantic flight.
- \$10,000 for the first flight between New York and Albany, a distance of 134 miles by air.
- \$25,000 for the first nonstop flight between New York and Paris – won by Charles Lindbergh flying *The Spirit of St. Louis* in May, 1927.

When entrepreneur Peter Diamandis read Charles Lindbergh's biography, he realized that Lindbergh's main motivation in making the nonstop flight between New York and Paris had simply been to win the prize on offer rather than to be a heroic trailblazer. As Diamandis read that, he had an epiphany. He thought that since offering prizes had stimulated the establishment of the commercial aviation industry, perhaps the same thing could happen to bring affordable space travel to the masses. Diamandis reasoned this would be the ideal way to challenge the perception space exploration was so expensive it required the resources of government funding to be achieved.

Diamandis therefore got the ball rolling on what would later become known as "The X-Prize". He decided the prize on offer for the first commercial space flight had to be large enough to attract attention and hopefully jump-start the commercial space industry but at the same time it had to be for something which was within reach technically. There was no use offering a prize to send someone to the moon right away because that would be unrealistic. Instead, the prize had to reward a baby step towards space travel. After discussing this for a while with all kinds of different people, Diamandis decided the first X-Prize should be \$10 million offered to whoever could achieve a suborbital flight – putting a space capsule into space and bringing it back again safely without actually completing an orbit of the earth. This had been the goal of NASA's early Mercury program before it had moved on to the Apollo program and Diamandis thought it would be an ideal first step for a private space industry.

With this in mind, the rules for the \$10 million X-Prize were drafted. To win the X-prize, you had to:

1. Build a manned spacecraft without any government funding.
2. Launch three people in the spacecraft to an altitude of 100 kilometers and return to the Earth.
3. Repeat step 2 with the same spacecraft within two weeks.

"Although much easier than reaching orbit, suborbital spaceflight would still represent a real challenge to the XPRIZE contestants. To reach 100 kilometers, the winning ship would have to travel Mach 3 – three times the speed of sound. Even though that required only 1/25 the amount of energy needed to reach orbit, it was still faster than any private aircraft ever built. Although the craft could climb through lower altitudes by conventional means – jet engines or a balloon – it would need a rocket engine to make the final run to space. It would need a life support system to keep the pilot and passengers alive long enough to reenter the

atmosphere, and some kind of maneuvering thrusters to orient it correctly for reentry. It would have to be sturdy enough to survive the heat and buffeting created by Mach 3, and it had to land in good enough shape to make the trip again within two weeks. The entire spacecraft and all of its engines and tanks had to be reusable."

– Michael Belfiore

There were a few minor details still to be worked out – such as where the \$10 million required for the prize was going to come from – but Diamandis got to work. He enlisted the help of a partner Byron Lichtenberg and established the X-Prize Foundation. Diamandis also approached Erik Lindbergh, the grandson of Charles Lindbergh, and invited him to sign on as an X-Prize spokesman and trustee. The X-Prize Foundation established offices in the St. Louis Science Center and on May 18, 1996 held a formal launch event. Diamandis was joined on the stage for the launch not only by Eric Lindbergh but also by Apollo 11 moon walker Buzz Aldrin and by NASA chief Dan Goldin who described the X-Prize as a "noble venture".

Burt Rutan and SpaceShipOne

The formal establishment of the X-Prize certainly had its desired effect. All of a sudden, engineering teams were established all over the place. Promisingly, many of these teams had new and novel ideas on how to actually achieve suborbital flight and some very creative product design projects sprung to life.

One of the first people to sign up to compete for the X-Prize was Californian aircraft designer Burt Rutan who was famous for designing *Voyager*, the first airplane to fly around the world without landing or refueling.

"I have dreamt about making a home built spacecraft ever since I've been doing home built airplanes, but I have never been, myself, as creative as I have been in the last couple of months, eyeballing this goldarned prize. And I'm not going to tell you what I've come up with because I want to win this thing. But I am going to tell you that I'm not the only one that's going to be creative."

– Burt Rutan

Burt Rutan hailed from the small town of Dinuba, California where he and his brother had grown up dreaming about flying airplanes. The son of a dentist, Rutan had flown solo in an airplane as soon as he legally could at age 16. He had earned a degree in aeronautics from California Polytechnic in 1965 and had found work as a civilian flight test engineer at Edwards Air Force Base where he was responsible for developing flight procedures for the F-4 Phantom fighter-bomber. In his spare time, Burt Rutan designed and then started building kits for a propeller-driven aircraft which had the agility and responsiveness of a fighter jet. The plane called the *VariVigen* featured a small set of secondary wings at the front called a canard. In 1974, Rutan set up a small business called Rutan Aircraft Factory at a deserted military airport located in the Mojave Desert where he could build prototypes to test his designs and sell plans and kits to aspiring home aircraft builders across the United States.

In the process of learning how to design and make home built airplanes, Rutan came across a new and novel manufacturing process which involved laying layers of fiberglass over foam that had been molded and cut into the desired shape. These composite structures were exceptionally strong and yet could be readily reshaped, added to or removed. This production method was also fast – it required only about one-quarter of the time

