

NASA v. SpaceX



As an 18-year-old in 1930, Wernher von Braun told a well-known scientist that he planned to travel to the moon. His Saturn V rocket took mankind there in 1969, but as impressive as making it to the moon was, von Braun still wanted more: he dreamed extensively of traveling to Mars. In his 1949 science fiction novel, "Project Mars: A Technical Tale," von Braun wrote the following:

"The Martian government was directed by ten men, the leader of whom was elected by universal suffrage for five years and entitled "Elon."

To those reading this passage today, von Braun's words immediately bring to mind Elon Musk, the entrepreneur behind PayPal, Tesla, and Space Exploration Technologies Corp., otherwise known as SpaceX. Musk's privately funded company has made significant leaps in technology and asset efficiency, making landing on the red planet not such a distant dream.

NASA: Infinite Budgets and Beyond?

President John F. Kennedy established an incredible objective for the United States' new space agency, NASA, in 1961: "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the Earth." It sounded like science fiction. A man on the moon? And within a decade? A new word was coined to describe such audacious goals: "moonshots." And yet, NASA accomplished this goal. However, in recent years, the agency has faced serious budget cuts and canceled missions.

Consider these NASA programs from recent years: a mission to retrieve part of an asteroid and transport it to the moon; a spacecraft to orbit Jupiter's moon Europa; an Earth science program to study Earth; a plan to build giant telescopes in space. None had as much significance as the moon landing, and none became the rallying force the agency needed.





Each program was shut down, albeit after drying up considerable resources. The space agency, as it turns out, doesn't have infinite budgets and beyond.

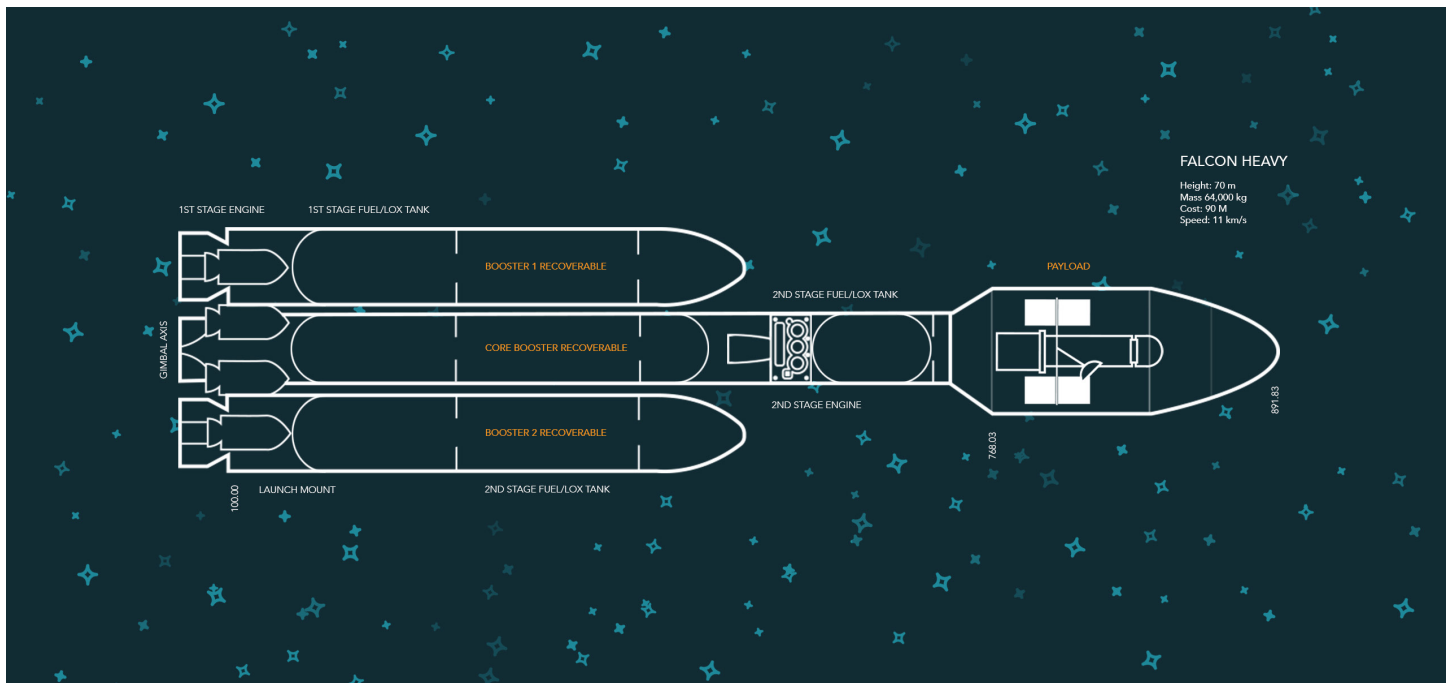
However, recent directives suggest NASA's plotting a course of re-entry to relevance. Its greatest step in reaching Mars has been the creation of SLS, the Space Launch System. The massive Space Launch System offers 3,800 square feet of cargo space, five times that of competitors, and is capable of carrying 77 metric tons to orbit. In the race to Mars, the SLS is formidable simply because it can carry so much at once, making, for example, building a Lunar Space Station easier by taking pre-assembled structures up at once. But the SLS sits at a heavy price tag of \$2 billion a launch, can only be used yearly, and must be scrapped after each use. This explains why NASA has reported that they will have spent \$210 billion by 2033 in their Mars-reaching efforts. SLS is an inefficient asset, even if useful.

NASA is still trying to relive its glory days, launching a single mission with a big payload. Certainly, the benefit of taking more and larger components into space reduces the complexity

of projects and is cost-effective in its own way, but the price of such inefficient rockets may keep NASA earthbound in the long run. NASA may need to take a giant leap if it's going to make any more moonshots, and if the success of the private aerospace sector is any indication, that giant leap may come in the form of smaller, reusable assets.

SpaceX: One Small Check for a Man, One Giant Leap towards Mars-kind

SpaceX's origin actually began with the hope of increasing NASA's budget. Elon Musk, the living embodiment of the prodigal, eccentric billionaire stereotype, wanted to reinvigorate the public's interest in space travel with a Martian greenhouse, the Mars Oasis project. Musk bemoaned the political and financial gridlock NASA was trapped beneath. After failure to secure deals, Musk was disappointed by NASA and Moscow's refusal to lift his dream, and after crashing a Mars Society fundraiser and reading some books on rocket propulsion, Musk decided he would create a rocket himself — one cheaper and more efficient than ever before. He founded Space Exploration Technologies, or SpaceX, in 2002.



The aerospace community celebrated earlier this year with Musk’s successful launch of the Falcon Heavy, SpaceX’s BFR reusable launch vehicle, capable of carrying 64 metric tons and costing only \$90 million — and dropping. Though smaller than the SLS, the Falcon Heavy has done what NASA never has: made space travel affordable. The reason? Musk’s keen business acumen and foresight to innovate.

Dr. Robert Zubrin, stated, “Seven years ago, the Augustine Commission said that NASA’s Moon program had to be canceled, because the development of the necessary heavy lift booster would take 12 years and \$36 billion. SpaceX has now done that, on its own dime, in half the time and a twentieth of the cost.” Several efficiencies are fueling Falcon Heavy’s pathway to the Moon, Mars, and more: streamlining its manufacturing process, reusability, and quick turnarounds.

SpaceX controls their product quality by building about 80% of its components in-house. Elon Musk went so far as to say that he, “passionately avoids space vendors” after seeing the time and price they demanded, preferring to innovate himself. Comparably, NASA has been using the Russian RD-180 rocket engine and Russian

Soyuz rockets for years. Constructing these smaller, lighter rockets is made far more efficient and safer when all the variables are monitored by SpaceX itself, passing the cost benefits to customers.

SpaceX’s largest innovation has been reusable rockets. Designed to be used 10 times with minimal turnaround, their boosters can be launched into space, detached from the payload, and returned to earth with remarkable precision. Normally these expensive assets were designed to either burn on reentry, become space junk, or fall into the ocean to sit in a museum if retrieved at all. Designing boosters durable and advanced enough to be utilized multiple times in the face of the complexity of space travel, SpaceX has opened the door to fast, economic options. The company has secured billions of dollars in contracts from NASA, and that alone speaks to the two organizations’ successes.

Quick turnaround also allows time to prepare for multiple launches a year, which will be necessary for quickly preparing deep-space missions. Ultimately, even if NASA’s SLS can take a massive payload, Musk’s Falcon Heavy can cheaply carry that and more in the same period.

As for assembling necessary large components in space, it's nothing too big for small rockets, and SpaceX's team has proven innovative with its assets when the need for profit has arisen.

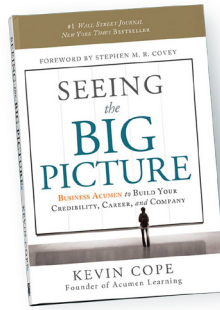
Conclusion

By smartly using its assets, SpaceX has solved the profit problem that has barred NASA from stepping on the Red Planet. SpaceX and its

rising competitors are innovating to overcome the difficulties of space and inspire new thinking that opens more options. For example, now SpaceX is developing Starship which can carry 130 tons of cargo — almost double that of NASA's SLS. In the end, everyone benefits from this wider door to the final frontier. Wernher von Braun planned to live on the moon, and Elon Musk plans to die on Mars. "Just not on impact."

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