

Falcon Heavy launch marks new stage in the privatization—and perversion—of space exploration

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On Tuesday, February 6, SpaceX corporation successfully launched the Falcon Heavy, combining the thrust of three Falcon 9 engines into one platform. The event was massively promoted by billionaire Elon Musk, who owns the company, and by the American media, and it evoked a definite response from the population.

More than 2.3 million people viewed the launch live on YouTube, while up to one hundred thousand gathered at Cape Canaveral to watch it in person. Cheers erupted both at launch and also eight minutes later when two of the three empty engines returned for an unprecedented dual landing beside the launchpad.

For at least a few minutes, people in the United States and around the world may have been excited by the prospect of a new advance in humanity's exploration of outer space. But hold the applause. The new rocket has two main purposes, neither of them connected with the development of science: to boost the obscene personal wealth of Musk, currently more than \$21 billion, and to expand the military arsenal of American imperialism.

The grotesque symbol of the first purpose was the placement of a Tesla roadster, manufactured by Musk's Tesla Motors, as the "payload" on the Falcon Heavy. The launch was viewed as too risky for an expensive scientific or military satellite package, so Musk had one of his own vehicles put into orbit around the Sun, to promote the interests of his current venture making high-end cars for the wealthy, costing upwards of \$140,000 apiece for vehicles with all the options.

Aside from its offensive vulgarity, there is a stark contrast between what Musk views as the "payoff" for space exploration—to boost his commercial interests on Planet Earth—and previous efforts by serious scientists. One only has to recall the work of Carl Sagan and others to craft artifacts reflecting the cultural achievements and diversity of the human species, which were placed in spacecraft like the Voyager probes, in the event that, far in the future, they might encounter some form of alien life.

Fortunately, there is little chance of such an encounter in the orbital path of the Tesla roadster, complete with "Starman" mannequin, which extends only to the asteroid belt. More likely, a future and more enlightened civilization on Earth will pooper-scoop that piece of junk from the heavens with a grimace of distaste for the primitive money-worship of its ancestors.

The more serious and ominous side of the Falcon Heavy launch is the celebration by Pentagon officials. According to a report in the *Financial Times*, "The Pentagon is eyeing the successful launch of Elon Musk's Falcon Heavy rocket as a way to erode the monopoly that has held sway over US military space launches for the past dozen years."

The newspaper quoted Deputy Defense Secretary Patrick Shanahan, a former Boeing executive, espousing the benefits of Falcon Heavy for US military operations, particularly the recovery of two of the booster engines, which point to potential cost savings of up to 90 percent from reusability.

"The fact that those capabilities are being delivered creates affordability and affordability spawns new space concepts," he told the *Financial Times*. The newspaper cited an unnamed official at US Air Force Space Command saying that the air force "will use data" from Tuesday's launch as part of its process to certify Falcon Heavy for military use, particularly in launching military satellites.

"We as a department need to be really good at space," Shanahan added. "If we're really good at space, defensively we're stronger. That's crucial capability that we really want to lift up." The recently issued National Defense Strategy document listed space as a "warfighting domain," but US military operations have been set back by reliance on companies with rockets less powerful than Falcon Heavy, and for their current heaviest-lift capability, reliant also on Russian-manufactured rocket engines. At the same time, Russia retains the monopoly on manned liftoff capability that it has enjoyed since the end of the US space shuttle program.

President Donald Trump and Vice President Mike Pence both issued tweets hailing the launch, which was carried out from the NASA-controlled launch pad at Cape Canaveral, made available because of the national security benefits expected from the development of Falcon Heavy.

For its part, the *New York Times* salivated over the fact that SpaceX will be able to "launch larger spy satellites," allowing US intelligence agencies to expand their foreign and domestic spying programs. More broadly, the launch demonstrates a development in missile technology that will no doubt be put to use as part of the Trump administration's trillion-dollar effort to modernize the US nuclear arsenal.

The Falcon Heavy has demonstrated the heaviest lift-capacity

into space of any currently manufactured rocket, but it still has only 45 percent of the capabilities of the most powerful NASA rocket, the Saturn V, which sent space capsules into orbit around the Moon, and made possible the Apollo XI landing and other manned missions.

This is despite the fact that Falcon Heavy benefits from the advancements in electronics, computing, rocket design and a myriad of other technologies that have become cheaper and more efficient.

The computers and sensors necessary to control the Saturn V rocket occupied a ring 7 meters across and a meter high stacked atop the third stage of that rocket. The gyroscopes of the Apollo age, used to control the attitude (spatial orientation) of the Saturn V, were the size of a microwave oven and required six months of complex assembly and calibration. The algorithms and mathematical calculations to guide rockets into orbit and to land on the Moon were solved using slide rules and computers the size of rooms with less processing power than an average modern calculator.

Today, gyroscopes cost \$2 and are found in every smartphone. Computers capable of sensing and correcting flight motions are found in children's quadcopter toys costing less than \$20. Engineers have access to computer drawing and simulation tools almost beyond the dreams of the Apollo era. Not only are 3-D printed rocket motors now entering space service, but students are now beginning to design and test these motors as school projects! These and countless other developments have led to the success of the Falcon Heavy launch, not the supposed genius of Elon Musk (whose expertise is largely in financial "engineering," as a co-founder of what became PayPal).

The result is that SpaceX has effectively remade the wheel, drawing on more than a half-century of experience and effort by NASA to travel beyond Earth, to make a new version of the Saturn V with ultra-modern components that is only 45 percent as powerful.

That is not to say that Falcon Heavy breaks no new ground technologically. Significant resources, estimated at \$500 million, have not been wasted, and the effort to build a reusable rocket booster was a distinct success, as two of the three sections returned as planned and were recovered, although the third crashed into the Atlantic.

Historically, the funding of large booster development was tied to national strategic interests. After the "space race", NASA budgets were cut by a factor of three by 1973 and left to wither for decades. During these long lean times, NASA management, frequently drawn from the military, came to embody the warning given by physicist Robert Wilson of the legacy of research starvation: "If we are not to do it with enthusiasm and rapidly, then it can still be done, but it will be done by second-rate people in a bureaucratic manner and it will be done expensively."

And yet these budget cuts remain, despite considerable and enduring enthusiasm for space science and exploration. One recent study showed 68 percent in favor and 17 percent opposed, remarkable figures for a program that promised no tangible reward to anyone, but was widely viewed as a venture that benefited

humanity as a whole.

During the period of NASA budget cuts, the competition of contractors also largely disappeared amidst a wave of consolidations. By the end of this period, Lockheed Martin and Boeing, often in joint ventures, dominated the field. Instead of making one new human-rated rocket and capsule every two years in the 1960s, the space shuttle became the sole U.S. human space technology for 30 years, 1981-2011, costing nearly \$1 billion per launch by the end of its life.

The supposed renaissance of spacecraft development is driven not by the real enthusiasm and curiosity of millions of people, but by the profit interests of a new generation of multi-billionaires with disposable cash, who see that the drastically reduced costs of development enabled by new technologies gives them an opportunity to enter a field competitively.

The American media celebrated the role of private capital in the new stage of the space program, and Musk is not alone in these efforts. The company Planetary Resources hopes to mine asteroids in the near future. Moon Express is attempting to create a market for periodic journeys to the Moon and back. Blue Origin, funded by Amazon's Jeff Bezos, is attempting to make suborbital spaceflight a commodity for the very rich and super rich.

The effective privatization of space exploration is deeply retrograde. As we have explained elsewhere, the earlier "space race" suffered from its nationally shut-in character, with separate, duplicative efforts by the United States and the Soviet Union, later repeated by the European Union and more recently by China, India, and even Israel and Iran, as each nation-state sought to gain the military-strategic benefits of the use of space as the ultimate "high ground" in future wars.

Now we have the prospect of private corporations owning and controlling access to space, and transforming that access into a commodity, whether for the launching of satellites or for vanity projects like giving orbital "rides" to individual millionaires.

Tragically, space exploration is being shifted into reverse, contrary to the historical development of mankind's increasingly social and collective effort to master nature and explore the universe, an effort that can only be realized through the struggle for international socialism.

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