# Pulling Mankind Onward And Upward in Space

by Michael James Carr

Nov. 21—Every Renaissance begins in revolt against a Dark Age. After the assassination of President John F. Kennedy, who gave the United States a "crash program" approach to mankind's journey into space, many people, even in important industries, went along with the idea that industry and agriculture run by inventive production people should be replaced with conglomerated institutions managed by "modern corporate structures and modern rules of business administration and accounting." Love of invention and production was replaced by love of money and personal "success," measured and rewarded by the "market." Economic decisions were to be based upon monetary returns in the short term, above all other bases of judgment.

NASA

*SpaceX/NASA Crew 1 Dragon* Resilience, *atop its Falcon 9 rocket in the SpaceX hangar at the Kennedy Space Center in Florida, before rollout and launch on November 16.*

With JFK gone, British Intelligence's Tavistock Institute of Human Relations, an early post-War NATO psychological warfare center, issued a 1960s series of reports discussing how to destroy Americans' remaining optimism about NASA and space travel. NASA's funds were almost totally cut off by war, even while astronauts were walking on the Moon. That cut-off was never reversed until President Donald Trump began to push NASA upgrades through Congress in 2017.

At last, in 2015-16, inside the United States, the slow but steady destruction of science, technology, industry, agriculture, and general living conditions, and the deliberate creation of costly and unnecessary foreign conflicts—in an environment shaped by circulation of Lyndon LaRouche's ideas over decades—led to a revolutionary upsurge against this British deindustrialization in the 2016 election. One of LaRouche's most brilliant and influential ideas was his Moon-Mars mission proposal, presented in 1988 in a nationally televised film, *The Woman on Mars*.

But before the 2016 political revolt, engineers were looking for ways to outflank the political pressure to shut down progress and industry. Instead of acting politically to overturn eco-fascism directly, engineers, as engineers, sought engineering solutions. As SpaceX founder Elon Musk reported, he didn't think that the future should be sad. Since the 2016 revolt, President Trump has moved to radically accelerate scientific and technological progress. This is most easily seen in the successful Operation Warp Speed for COVID-19 vaccine development and distribution. But it is also seen in his adoption of a version of the LaRouche Moon-Mars Program for spreading civilization to the Moon and Mars.

On a broader scale, China, after suffering through the consequences of the Cultural Revolution, began seeking out and testing new ideas. After the collapse of markets for its exports in 2008, China's leadership adopted a version of LaRouche's idea to redirect its economic policy away from dependency upon exports; China should instead build up its own infrastructure, own market, and concentrate upon raising both the pro-

ductivity and standard of living of its workforce. China did make such a change. Then, in 2013, Chinese President Xi Jinping announced a set of policies jointly known as the Belt and Road Initiative that closely align with ideas developed and promoted by Lyndon and Helga LaRouche beginning in 1989. It took the successful Chinese domestic infrastructure building program, developed in response to the 2008 crisis, and directed the building process outward across Asia and into Europe and Africa.

## From *Stasis* to Breakout

Let us look back into the past a bit and trace some of the processes which have been building up in intensity to the cusp of a breakout of progress.

The success of Wernher von Braun's rocket team in Germany, led Stalin to release Sergei Korolev from the Gulag to *allow* him to create the Soviet rocket program. In turn, Korolev's success in launching *Sputnik* led the Eisenhower administration to finally *allow* von Braun's rocket team to launch a satellite. Later, Korolev's success in launching Yuri Gagarin into orbit led President Kennedy to *allow* von Braun to build the Saturn V moon rocket. It was a counterpoint whose beneficiary was the entire world.

The early deaths of Korolev (in 1966) and von Braun (in 1977) were an irreparable loss to humanity. The rate of change in space technology slowed way down. Imperial tentacles inside the Soviet Union and the USA moved to shut off the spigot of rapid progress—as demanded in Tavistock's 1967 *Rapoport Report*. The Soyuz spacecraft attached to the International Space Station (ISS) today, is a derivative of the Soyuz spacecraft and launcher system which was being developed at the time of Korolev's death. The American shuttle system which built much of the ISS and flew up until 2011 was a compromise on the original design upon which von Braun had been working at the time of his death.

Despite the slowdown in the advancement of space transportation technology, rapid improvement in electronic and communication technologies opened up the possibilities for small satellites to do big jobs. Elon Musk's plan was to spur public support for NASA and space exploration, by spending a third of his fortune to buy a few old Russian ICBMs with which to launch a little greenhouse to Mars.

Finding that the Russians would not sell, on the way back from his last Moscow trip he started to calculate. The cost of the materials in the required rocket would only be 2% of the cost of the rocket. If he could independently build a small rocket, he might be able to put small satellites into orbit and reinvest the returns received into designing and building bigger and better rockets. He then began to seek out American rocketeers with ideas as well as experience, and founded a company, Space Exploration Technologies, or SpaceX. See "A Real Revolution in Space," in the June 26, 2020 issue of *EIR* for more on this history. After three failed launches, in 2008 SpaceX became the first private company to put a small payload into orbit.

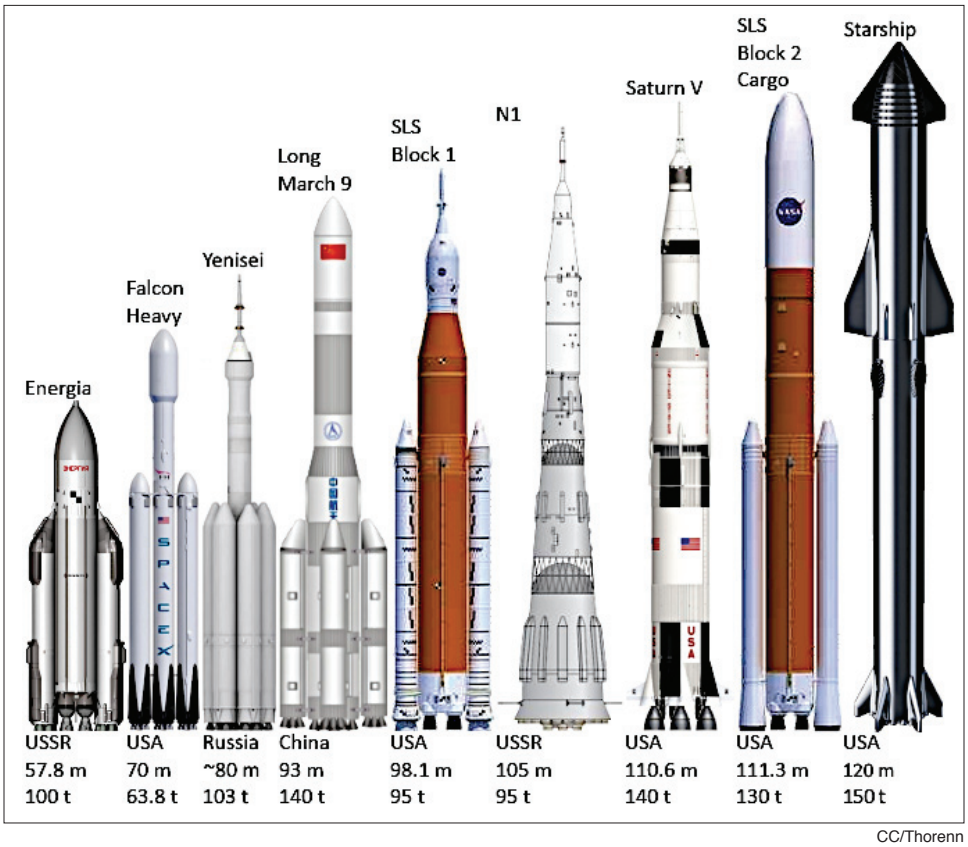
Last week, SpaceX, with lots of original ideas and lots of help from NASA, became the first company to transport a crew to the ISS in regular taxi service—quite a feat in a 12-year period.

## Next Steps—Starship and Competitors

That is a wonderful accomplishment, but that is not the end goal. SpaceX has been concurrently working on a fully and rapidly reusable family of systems known as the Superheavy/Starship combination. It is to be more powerful than any rocket system ever built before. The eighth prototype of the second stage of this system is to perform a test flight before the end of 2020, in which it is to ascend to an altitude of 15 km and then land back at the launch pad. Fabrication, modification, and testing of prototypes are proceeding rapidly.

Lyndon LaRouche would call these "shock wave" technological effects. Usually physical economists think in terms of cycles: production cycles, product lifetimes, tool lifetimes, worker lifetimes, debt payoff terms, time to breakeven, etc. They all relate to the ultimate measure of economic activity: the increase or decrease in *potential relative population-density*. In a crash program, such measures, except for this ultimate one, are discarded. Technological attrition (superseding each technology with a better) is accelerated. Ideas are developed into designs, which are built, tested to failure, then rebuilt with an even better approach. Tooling and machinery may be tossed out after only one use. No thought is given to accounting principles. The principle is: Think it, design it, build it, test it, then make it obsolete as fast as you can.

The entire satellite launch industry is being reorganized because of the rapid changes in pricing and capabilities offered by SpaceX. For example, United Launch Alliance (ULA), a joint venture of Boeing and Lockheed Martin, faced certain extinction if it did not reor-




*Comparison of two versions of NASA's SLS rocket and SpaceX Starship/Superheavy combination with other rockets.*

ganize itself to be more competitive.[1] For decades, the United States had launched deep space probes and national security satellites on one or another derivative of the decades-old ULA Atlas or Delta rocket systems. The NASA *Perseverance* Mars rover launched this summer on a ULA Atlas V rocket.

In order to maintain an assured national security launch capability, ULA was required to maintain two separate rocket production lines offering a total of 40 different launch configurations. ULA's amazing reliability rates came at a high cost. Since the United States now has another reliable launcher system, ULA is closing the Atlas and Delta lines, replacing the 40 offerings with six to eight versions of a new rocket known as the Vulcan. Among other features, the Vulcan will eject its first stage engines for reuse on later flights.

Vulcan is scheduled for its first launch in early 2021 and, once certified, will become the launch vehicle for Boeing's Starliner commercial crew system. Also, France's Arianespace is building the new Ariane 6 rocket with the intent of lowering launch costs by 40% as compared to the Ariane 5. There are many more players in this area, including startups seeking to emulate SpaceX—such as Blue Origin, Rocket Lab, Relativity Space, Astra, SpinLaunch, and many more around the world—each with its own special twist or improvement. Whether legacy companies or startups, they are all struggling to compete with SpaceX. Expendable systems just cannot compete with rapidly reusable systems.

But gain or loss of market share is not the point. From the beginning, Elon Musk expected to lose his investment in SpaceX. His actions were governed by realization of his mortality and a totally normal human intention of accomplishing a mission he had set for himself. In this case it was the mission of contributing to the success of NASA in making civilization multi-planetary.

A new company composed of people with decades of experience working on the ISS project, Axiom Space, has a contract with SpaceX to launch its people to the ISS next year. Axiom will be doing initial space manufacturing tests aboard the ISS, before launching entire manufacturing modules to it, and later detaching a cluster of

1. Musk has had a similar effect upon the auto industry. Despite the inherent superiority of electric motors over steam or internal combustion engines, Thomas Edison's failure to solve the battery problem forced his friend, Henry Ford, to give up on electric cars and proceed to develop and mass produce gasoline powered cars. The advent of Lithium-ion batteries made battery powered cars a possibility. Musk invested a second third of his fortune in a little company called Tesla and by 2011 produced the Model S, whose performance characteristics were superior to, or at least comparable to, those of the most expensive production cars in the world. Many believed that the Model S was the best sedan of any type in the world.

This car changed everything. Suddenly, GM, Volvo, and VW announced they were planning to produce nothing but battery or fuel-cell electric motor vehicles in the medium-term future. Musk's recent announcement of new battery technologies soon to be in every Tesla, will lead to pricing parity between Teslas and comparable internal combustion cars. The huge advantage battery powered cars also have in maintenance and fuel costs will soon make battery powered cars the preferred choice of buyers in most situations.

modules to create the first orbital factory.

The radical drop in the physical cost (physical effort, not money cost) of getting people and machinery into orbit, is opening a whole new range of potentials. The SpaceX Falcon 9 launch system lowered the cost of cargo launches by nearly an order of magnitude. Expect that the Crew Dragon system will accomplish a similar drop in the cost of getting people into orbit. More and more of us are going to be living and working in space!

NASA

*The core stage of the first Space Launch System (SLS) rocket being prepared for a test firing by the end of this year. It will launch an unmanned Orion spacecraft around the Moon next year on its first test flight.*

## Artemis to the Moon

Notice that we have not yet even begun to discuss the Artemis program. Artemis is an initiative of President Trump (showing his intention to make permanent improvements in civilization). Artemis aims to establish permanent human lunar surface operations by 2028 that will underpin and facilitate the human exploration of the surface of Mars. The Artemis program's Space Launch System (SLS) rocket will undergo rocket test firing before the end of this year and in 2021 will launch an unmanned NASA/Lockheed Martin Orion spacecraft around the Moon in the rocket's first test in space. Next, development of a new lunar lander is necessary.

As in the case of NASA's commercial crew program for the ISS, NASA is intending to contribute only part of the development costs associated with development of two competing lunar lander designs. The final designs have not yet been picked from the three still in the running. And Congress only partially funded NASA's request for lunar lander work in 2021. The human lunar lander derivative of the SpaceX Starship/Superheavy system may or may not be selected for further development by NASA's Artemis program. But the Starship system with its on-orbit refueling ability will provide the capability of delivering huge cargo loads to the lunar or martian surface at very low costs relative to anything else in the near future.


CC/Nomadd

*SpaceX Starship prototype SN8, which will fly to 15 kilometers altitude and land back at the launch site before the end of this year.*

Beyond the initial steps to get people back to the Moon, Artemis requires fundamentally new technologies to (1) power operations on the Moon or Mars, and (2) provide continuous powered flight (continuous acceleration/deceleration) to speed up travel through high-radiation deep space and thereby minimize radiation health risks to astronauts.

The NASA/Idaho National Laboratory Kilopower project, to build small nuclear reactors up to the 10-kilowatt size to power Moon or Mars surface operations, could be available in time to power lunar surface operations. This should be accelerated along with NASA's work to produce a nuclear thermal rocket (NTR) engine. NTR engines give roughly twice the specific impulse (or thrust per unit of propellant, as compared to chemical rockets. These space projects are also related to the development of small modular reactors (SMRs) by a number of companies (for example NuScale Power) in several countries. All of these projects have been

given new life under President Trump's initiative.

If we are to settle Mars, we will need a further leap of energy-flux density in power sources. We will need fusion power for surface operations as well as flight times to Mars of weeks instead of months. We will need electromagnetic launchers and spaceplanes—plus technologies of which we haven't a clue today. See "Moon-Mars Crash Program Under a Four-Power Agreement," in the October 26, 2018 issue of *EIR* for a review of some of the revolutionary new technologies that must be developed to enable mankind to become truly multi-planetary.

NASA/Aubrey Gemignani

*Representatives of Congress and the National Space Council join President Donald Trump, Apollo astronaut Jack Schmitt, and current NASA astronaut Peggy Whitson for the President's signing of Space Policy Directive 1, recommitting the nation to a manned space program.*

We have been blessed by people like Lyndon LaRouche, Elon Musk, Donald Trump, and Xi Jinping, who have acted to begin to move society out of imperial *stasis* and toward a new Renaissance. Many more, whose names remain little known, have also acted in that direction. Now the future is in *our* hands. We must act to finally close down the imperial operations still running loose in the world and *allow* President Trump, President Xi, President Putin, and Prime Minister Modi to sit down and work out a New Bretton Woods agreement, along with a division of labor that will allow the settlement and development of Mars, even as we settle and develop the barren lands of Earth.