Lunar and Martian Missions Are in Our Immediate Future!

by Michael James Carr

This is the edited transcript of Mr. Carr's presentation to the June 6 conference. Subheads have been added.

Let me quote Elon Musk from 2012: He says, "I think there are probably too many smart people pursuing internet stuff, finance and law. That is part of the reason why we haven't seen as much innovation."

That's the way he looks at it, but the truth is that ever since the founding of the United States, which was the original revolutionary institution in the world fighting for uplifting all of humanity around the principle of the General Welfare, we've been continuously under attack. Sometimes it was in warfare directly; at other times it was through the other known means of the Empire. But in particular, in the past hundred years, there have been really only two periods in which American System policies have mostly prevailed. That was during the administration of Franklin Roosevelt, and in the administration of President Kennedy. We've been under heavy attack: In 1963, President Kennedy was killed. Even before we landed on the Moon, beginning in 1967, there were a great many layoffs in the aerospace industry. In 1968, Martin Luther King and Robert Kennedy were killed.

Moves were made to shut down the United States: In 1967, the British psychological warfare institute, the Tavistock Institute, came out with a report that said that *at all costs the space program of the United States must be shut down. All the kids want to be scientists and engineers! We have to stop that!* So, even at the time of the first Moon landing, the Apollo program was already being shut down. It was being turned into a no-future operation: There was to be no follow-on.

There was a huge fight, which we in the LaRouche movement waged, along with other people, to build the Space Shuttle, which was an idea of Wernher von Braun, but there was so much political haggling and undercutting that what came out was nowhere near what Wernher von Braun and people at North American Aviation had in mind when they first made the proposal, for a fully reusable surface-to-orbit, two-stage flyback system.

We just barely got the Space Shuttle. And that was after a long hiatus, from the 1975 Apollo-Soyuz test project, to 1980, when the Shuttle first flew. It was really only because of the courage of the astronauts and some other people that we were able to get that. But the nuclear industry, the space program, the work on supersonic transportation, work in high-speed rail—everything that had to do with creating a better future that was necessary not only for the people in the United States, but for those people today who are suffering from the locusts in East Africa and South Asia—was under attack.

You had a situation in which the young people who were interested in a future in science and technology were left high and dry. They didn't have much opportunity to implement their dreams, because we didn't have a credit system; we didn't have a policy to promote the development of industry. We had a policy to shut it down and go back to the colonial status.

LaRouche identified, as the basis for the future of society, the principle of the utilization of insight, combined with fighting through to get that insight into production. I will mention three people, who represent that principle: Henry Ford, Wernher von Braun, and Elon Musk. They've not been right about everything; they've made mistakes, but they deliberately set out to transform civilization for the better. Just the other day, before the SpaceX Falcon 9 launch on May 30, NASA Administrator Jim Bridenstine said that we need to inspire hundreds of Elon Musks, because we need to massively increase the rate at which technological advance takes place.

Miracles are Possible

I want to review some aspects of what was done by SpaceX because it's really miraculous. As with the operation to destroy the Apollo project, and the operation to destroy the Space Shuttle even before it was launched—when the Shuttle program was shut down and it was proposed that we just have some private contractors made responsible for sending people up to the Space Station, it was assumed that maybe Boeing *might*

be able to do it, but really it was assumed that probably the proposal would not work. That was the intent! The *intent* was for the Commercial Crew Program to fail!

Let's review a timeline of what the SpaceX people did.

SpaceX was founded in 2002. In 2006 they had their first launch which ended in failure; they had two more failures. Finally in 2008 they finally reached orbit with the Falcon 1. In 2010, they had the first Falcon 9 launch. The Falcon 9 has nine engines in the first stage, instead of one, enabling it to be more powerful.

In 2015, they had the first landing of a first stage back at the launch site, and in 2016, the first vertical landing on a ship.

What was done at SpaceX was the rapid adoption of new technologies. The cockpit display of the Crew Dragon *Endeavour* going into orbit last Saturday is totally different from any other cockpit of any other spacecraft. When the astronauts saw what was intended, they were a little bit wondrous about whether the touchscreen technology would work or not, because they were used to a totally different configuration. Once they went through the technology, they saw that this was going to work.

NASA

An interior view of the NASA/SpaceX Dragon Endeavour *cockpit, unlike that of any other spacecraft.*

The rocket and crew capsule were designed to be autonomous and to fly into orbit and dock with the International Space Station (ISS) without pilot astronauts. The two NASA pilots, Robert Behnken and Douglas Hurley, who launched on Saturday, are test pilots trained in testing new equipment in extreme situations; they're hands-on people. But this system is designed to take people with very minimal training up into orbit.

In the Near Future

There's a huge amount of activity coming up immediately. There's going to be another unmanned test launch of the Boeing Starliner this year. Next year there's going to be an unmanned launch of the Orion spacecraft around the Moon.

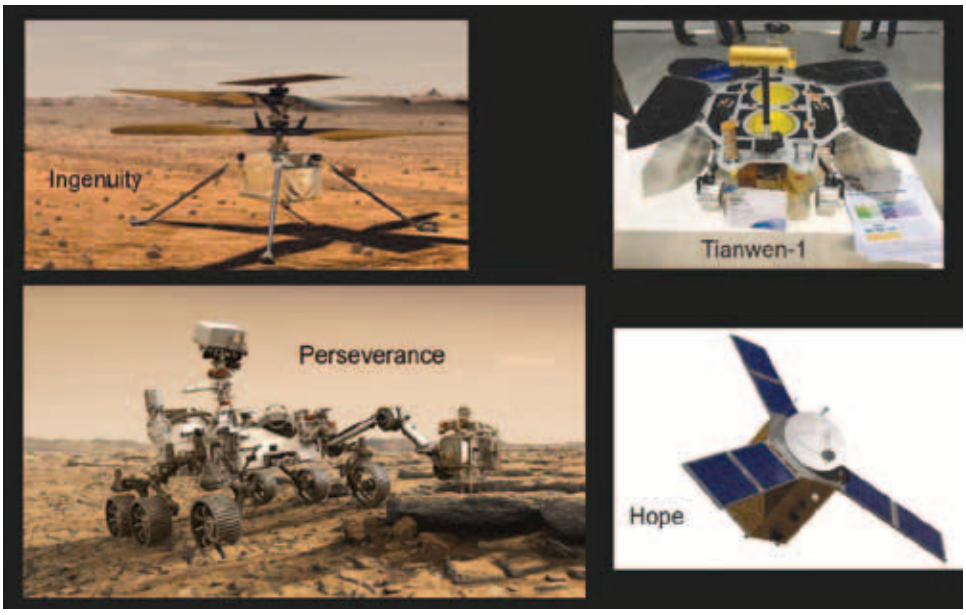
So, we're about to have three American manned spacecraft in operation starting next year—in contrast to the last nine years of having none.

Also next year, Sierra Nevada Corporation's Dream Chaser spaceplane is scheduled to start carrying cargo up to the International Space Station. Sierra Nevada intends to make it a manned vehicle, but for the time being the contract from NASA is for unmanned cargo flights. The vehicles that we have so far, have limitations. We have a long way to go before achieving the ultimate vehicle. For example, the Starliner lands on land, under parachutes; the SpaceX Dragon lands in the water under parachutes. The Dream Chaser, with the ability to land on a runway, is a step in the right direction.

Of course India and China are also going to fly new manned spacecraft in the next two years, and China next year will start building a space station, using a version of the Long March 5 rocket. The new Chinese spacecraft will have the International Docking Adapter system, allowing China to be integrated with the rest of the international space community, if we politically straighten out the mess we have with some of our congressmen.

What does the Crew Dragon *Endeavour* launch open up? It opens up a huge array of possibilities. Earlier this year, a company called Axiom Space signed an agreement with NASA to start tests of various manufacturing capabilities on the ISS, and then to start adding modules to the ISS. They have identified as targets for space manufacturing in orbiting space stations or space factories, fiber optics; higher strength, lower-weight alloys; satellites; biomedical research components such as protein crystals; growing organs and tissues in space, with a sort of biological 3-D printing capability which is being developed; and micro-encapsulation of things for biomedical and pharmaceutical purposes.

Once Axiom has proven these technologies, and proven the ability to manufacture in space, they have



Credits clockwise from lower left: NASA, CATC, UAE Space Agency

Leaving for Mars this summer are (clockwise from lower left) NASA's Perseverance *rover with its associated* Ingenuity *helicopter; China's* Tainwen-1 *rover; and the United Arab Emirates'* Hope *orbiter.*

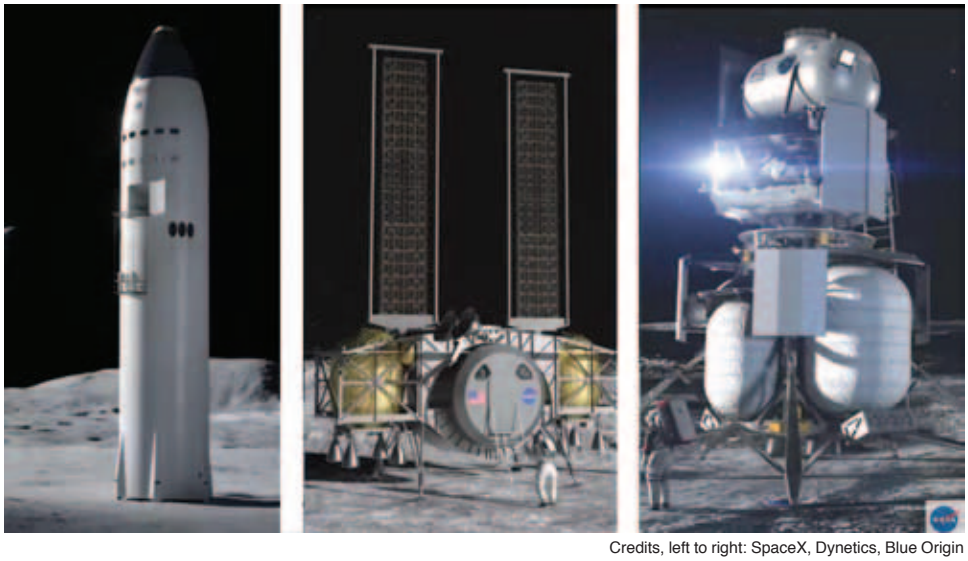
the idea that they would break off these modules and create separate stations, separate factories in space, separate from the ISS, and that these could be proliferated to fulfill the manufacturing demand. So if we have the kinds of technologies which the Dragon spacecraft represents—which means basically a massive reduction in the cost of getting people to orbit, comparable to the massive reduction in cost of getting freight into orbit that the Falcon 9 represents—then you have the possibility of whole new areas of industry and science opening up in low Earth orbit.

Space Stations, Landers and Rovers Going Up

Another company, Bigelow Space, which has an inflatable module on the Space Station right now, has ideas for building inflatable space stations for manufacturing. The owner of Bigelow is a hotel magnate, and he wants to use these for hotels in orbit, too. None of this could be done before because the price of getting people into orbit was too expensive, but now it's becoming more reasonable.

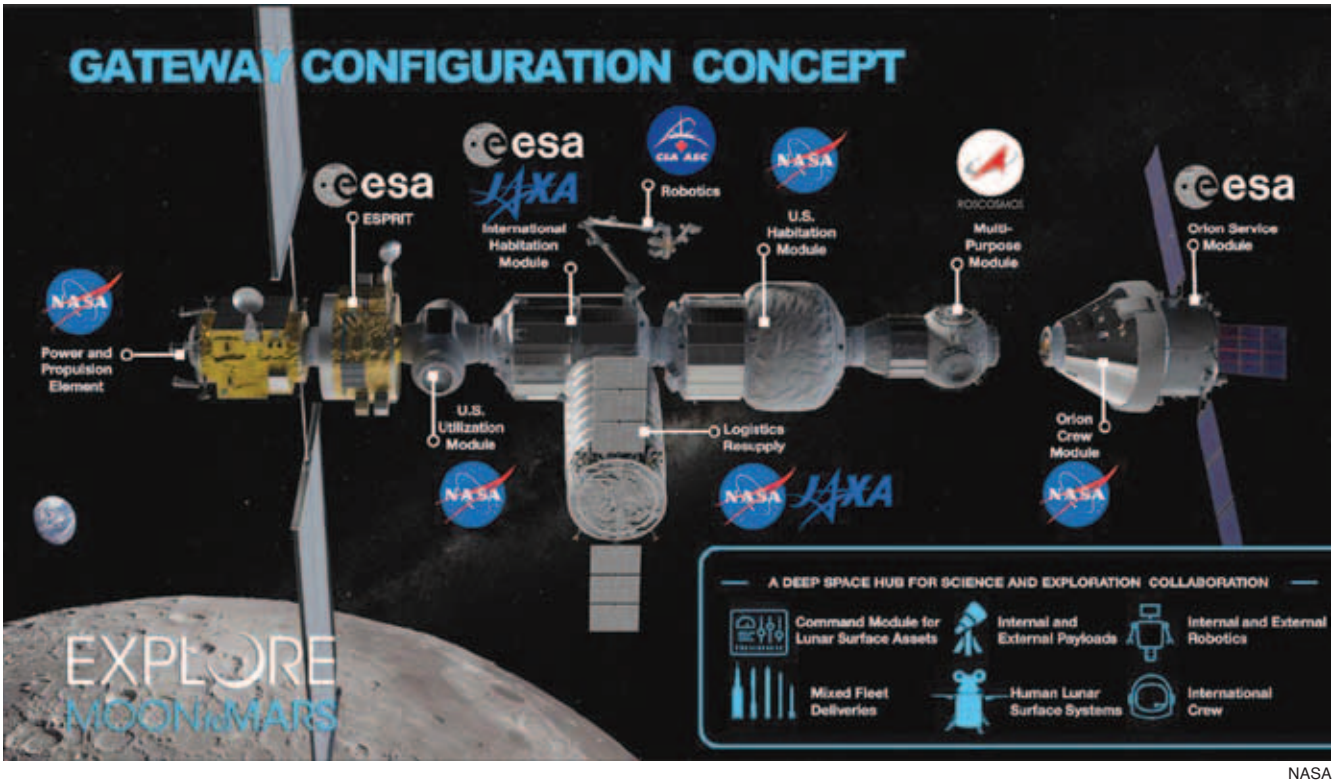
Building out the infrastructure from the Earth, to low Earth orbit, and then to the orbit of the Moon, NASA along with many international partners is contracting and negotiating the building of a small man-tended space station called the Lunar Gateway. It will be a stopping-off point en route to landing on the surface of the Moon or Mars. It's a nodal point for refueling and for accumulating various modules, parts and equipment for landing on the Moon and returning from the Moon back to Earth.

Three weeks ago, NASA signed contracts with three contractor teams for three different lunar landers. The Blue Origin National Team, which includes Lockheed Martin and Northrop Grumman, has a design proposal



Credits, left to right: SpaceX, Dynetics, Blue Origin

NASA has selected three companies for $1 billion in contracts to design lunar landers, "one of which will put the first woman and the next man on the Moon by 2024." Left to right: SpaceX's Starship; Dynetics' Human Landing System; and Blue Origin's Integrated Lander Vehicle.



NASA

A configuration concept of the planned Lunar Gateway, indicating a potential division of labor among contributing international partners.

which bears many similarities to the original Lunar Modules of Apollo—but on a larger scale.

A very unusual lander design is that proposed by Dynetics. Instead of having an ascent stage and a descent stage, as had the original Lunar Modules, this design has two extra drop tanks—like military aircraft that have extra tanks for fuel under the wings for long-distance flight. These fuel tanks can be dropped off, and then when the vehicle reaches the surface it has less weight, and can take off without the extra weight of the empty drop tanks. It has eight small engines to minimize the spray of lunar dust, and it puts the crew very close to the ground, unlike the other two designs.

The third contract is for a modified version of SpaceX's next big project: the super-heavy, fully, and rapidly reusable Starship rocket system. To minimize lunar dust, the descent/ascent engines are located three-quarters of the way up the height of vehicle. This vehicle is so tall that it will have to have some type of elevator. I don't know how that will work. But these things are all under investigation during the next ten months of the competition. But there's a lot of activity, and as we get the credit system and the physical backing for this kind of activity, it will be rapidly expanded in all directions.

Next month the United States will be launching the *Perseverance* rover to Mars, an updated version of the *Curiosity* rover still roving there. It will also have aboard a little Martian helicopter called *Ingenuity*. Also in July, China has scheduled the launch of its *Tianwen-1* rover for Mars. The Mars orbiter *Hope*, built in Colorado and sponsored by the United Arab Emirates, will be launched on a Japanese rocket this summer.

We are still fundamentally behind where we need to be to make operations to low Earth orbit and to the Moon the kind of thing that we're used to as we fly across the ocean. We're making advances, but we're still far from where we need to be.

To summarize: We've got all kinds of work going on, and potential beyond. We have to get to it. We need LaRouche's Four Laws; we need the credit policy; we need the tax policies; we need the policies to encourage the development of the entrepreneurs who exist out there, but who do not have the credit or backing to test out their ideas.