

We Will Not Go To Mars

by [Adam Selene](#) (July 2019)



With All The Fucking Force, Michael Kagan, 2011

It is 50 years since the United States of America, in one of the defining triumphs of the American century, put men on the Moon. Yet the dozen men who set foot on the Moon between July 1969 and December 1972 remain the only humans to have done so. Only four of them are still alive.

By 1972, the public seemed over the Apollo program. Of the

twenty planned missions, three were [committed](#) the United States to:

Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities. Beginning with missions beyond low-Earth orbit, the United States will lead the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations.

The Directive set no timeline, but Vice-President Mike Pence announced in April 2019 that the Trump administration's [tweet](#) on 8 June, questioned the money being spent on the been-there-done-that mission to the Moon and said NASA "should be focused on the much bigger things we are doing, including Mars."

Private sector champions of ambitious space exploration are as confused as the government about the way forward.

Elon Musk, admired for his boyish, entrepreneurial spirit, leads the private-sector developers of Mars missions. He [acknowledges](#) that, "when you seriously consider . . . a base on Mars," you need "thousands of ships and tens of thousands of refilling operations," demanding "hundreds of launches a day."

Musk has been around long enough now to have a track record of over-promising and under-delivering. I cannot begin to take

seriously his timeline for a first crewed mission to Mars.

Jeff Bezos is another billionaire, with much deeper pockets than Musk, developing space dreams through his company Blue Origin, on which he's reputed to be [presentation](#) on 9 May 2019.

His rationale for space is civilizational dynamism: a choice between stasis and rationing in an Earth-bound civilization, or one of dynamism and growth through moving out into space. To do this, he says, space travel needs to get a lot cheaper. He sees two gateways to progress: a radical reduction in launch costs through reusable launch vehicles; and the use of in-space resources—specifically, water from the Moon. Bezos says that, “our job, in this generation, is to build the infrastructure—to provide the low-cost access to space.”

Unlike Trump and Musk, Bezos doesn't [The Solar System Trail](#).

One metre in the scale-model sculpture is equivalent to one million kilometres in the actual solar system. The Earth is a chickpea-sized stainless steel ball, which sits on a plinth. The Moon is on the same plinth, 38 centimetres (15 inches) away. Mars, on the other hand, is 77 metres (253 feet) away. The outer planets stretch for miles along the foreshore.

The furthest any humans have been from Earth is 400,000 kilometres (250,000 miles), a record set when the crippled Apollo 13 swung around the far side of the moon in April 1970. That's only 40 centimetres (16 inches) on the Melbourne solar system model. Yet these Apollo missions are epic voyages

compared to other crewed space missions—the International Space Station is 408 kilometres from Earth, which would be less than half a millimetre (or about a sixty-fourth of an inch) on the model.

Mission duration is another lens through which to view the distance issue. The Apollo 11 [mission](#) that landed Neil Armstrong and Buzz Aldrin on the moon lasted 195 hours and some minutes—about eight-and-a-quarter days.

According to the NASA Goddard Space Flight Center website, the ideal line-up for a launch to Mars would [announced](#) in April that “it’s time to go back to the Moon, this time to stay,” and that Blue Origin intends to have its Blue Moon lunar lander take humans to the Moon by 2024. But his Moon mission is only “a necessary first step” to the O’Neill colonies.



Bezos transcends with colossal scale the claustrophobic confines of our images of space station interiors. His O'Neill colonies are huge rotating cylinders, housing a million people, with breathtaking scenery and their own weather patterns. Some, he says, could even be "national parks." In place of the deadly reality of space, Bezos throws up a hospitable artificiality, with imagery that recalls the 19th century landscapes of the Hudson River School painters of the American sublime.

For a reality-check comparison, the largest habitable space environment built so far is the [cost](#) \$150 billion. It has the habitable space of a large house, with sleeping quarters for six, two bathrooms, a gym and a 360-degree view bay window. NASA and its international partners assembled its main modules over a decade, which involved 42 flights, 37 of them on the Space Shuttle.

Bezos wants to expand human civilization into the solar system at least in part to preserve our unique blue planet, which, he [Norilsk](#), an industrial city of 175,000 in Siberia, dominated by mining and metal industries, built by Soviet gulag prisoners to exploit the region's resources, might be an example of the kind of dedicated heavy-industry colony Bezos's vision presumes, but hides from view.

In Bezos's heavy-industries-off-Earth vision, how would any of the products of these industries get to Earth? Consider steel, perhaps the archetypal heavy industry. Would billets of steel, by the millions of tonnes per year, enter through the Earth's atmosphere, to land—where, and how—on Earth? They'd still need to be made into girders, cars, ships, machines, and a myriad of products here on Earth. Or does Bezos imagine cargoes of

finished goods, like cars, parachuting from space to show rooms all over the world? Apart from the sheer implausibility of the entry and landing, that would mean space-based facilities for all the materials that go into cars—including glass, plastics, rubber, electrics and the rest.

Large parts of the chemicals industry are based on organic feedstocks, like oil, natural gas, and coal tar. Coal and oil are not present in space. Methane, the main constituent of natural gas, is [report](#), is worth reflecting on when considering the breezy visions for moon bases to provide materials for further space exploration:

Dust—I think probably the most aggravating, restricting facets of lunar surface explorations is the dust and its adherence to everything no matter what kind of material, whether it be skin, suit material, metal, no matter what it be and its restrictive friction-like action to everything it gets on.

The report concludes that, “for lunar exploration missions, perhaps its greatest challenge will be to learn to live with lunar dust.”

Beyond the utopian, science-fiction visions of billionaires, what about an actual plan. NASA is charged under Trump’s Directive to go to the Moon and to Mars. With its international space agency partners, NASA outlined a [report](#) summarises NASA’s plans as follows:

Under current and notional NASA plans, the Gateway, a small human-tended station in orbit around the Moon, would be assembled in space between 2023 and 2026 for the purpose of providing a platform to study the lunar environment, gain deep space operational experience, and stage missions to the Moon and Mars. Human missions to the Gateway are to be launched using the Space Launch System and the Orion Multi-Purpose Crew Vehicle (Orion). While not explicitly noted in current NASA plans or budget requests, the next step for a human orbital mission to Mars would be the formulation, design, fabrication, assembly, integration, and testing of the Deep Space Transport (DST), a vehicle that will take a crew to Mars orbit. After several years of in-space testing, the DST will depart on a 1,100-day crewed mission to Mars orbit.

The report concludes that: "A Mars orbital mission could be carried out no earlier than the 2037 orbital window without accepting large technology development, schedule delay, cost overrun, and budget shortfall risks. Further budget shortfalls or delays in the construction or testing of the DST would likely require the mission to depart for Mars in 2039 at the earliest." The report assesses total system costs from 2019 through to 2037 at \$184 billion, in 2017 dollars. The human mission to Mars orbit is \$83 billion of that total, with the balance covering lunar missions and other human spaceflight. And that doesn't get boots on the ground on Mars—only an orbital mission.

This schedule rests on two critical assumptions. NASA must settle the Mars orbital mission design promptly, because it drives the development of the Deep Space Transport, and not spend too much budget on Gateway and lunar operations, which would throttle its ability to devote resources to the Mars

objective.

Since the report came out, Vice-President Pence has accelerated the timing for the Moon mission to 2024. NASA has [responded](#) by cutting the Gateway to a “minimum configuration” in the first instance, getting “stronger commercial engagement sooner” and “focussed urgency and energy to accomplish 2024.”

The Mars Society, while welcoming the Pence statement, is critical of the Gateway concept, which it calls a “Tollbooth.” President of the Society, Robert Zubrin, argues for a “[defends](#) Gateway as an “adaptable” platform.

Wernher von Braun made the case for space to the American public in the early 1950s in a [The Case for Space](#), that in the 50 years since Apollo, “our robotic planetary program has performed epic deeds of exploration, while our human spaceflight effort has stagnated.” He thinks we’re “poised for a breakout” driven by a new entrepreneurial spirit in the space industry, led by Bezos, Musk and others. This motivates him to outline his vision for what we might achieve in the next 50 years—that is, by 2069.

We will have fusion power and open-sea marine aquaculture and no longer be living in fear of climate change and resource exhaustion, or each other. We’ll be a cosmopolitan civilization, able to travel the globe freely through suborbital space in less than an hour, so that nearly everyone will have friends in nearly every land. We’ll have research laboratories, industries and hotels in orbit . . . There will be . . . cheap lifting of propellants to lunar

orbit to support exploration missions to the outer solar system. We will have city states on Mars—vibrant optimistic centers of invention, sporting lively and novel cultures, with many casting off the chains of tradition to strike out on new paths to show the way to a better future.

The techno-jingoism of Musk, Bezos and [story](#) in *The Washington Post* on American attitudes to space.

The [survey](#) on which the story was based found that, “less than half the public supports spending billions of dollars specifically to send astronauts back to the moon or to other planets.” Women are significantly less supportive of such spending than are men.

Jeff Foust, senior staff writer at *Space News*, tacitly acknowledged the softness of public support for space exploration when he concluded a [answered](#), “I’m sure he will—but it will be a century or more before he is ready.”

On current plans, von Braun’s century or more from 1954 is not likely to underestimate the timeframe—we won’t get to Mars, boots on the ground, before 2054. But will the transcendent vision for human space exploration sustain sufficient interest and funding for another generation against the demands of other priorities? The question is rhetorical, because the reality is we’ve already moved on. We will not go to Mars.

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