

Connecticut Debate Association

November 13, 2021

This House regrets the rise of space tourism.

A Note on Regrets Motions

1. *Regrets motions are not restricted to the past. Both teams are free to consider the past, present and future impacts of the issue in question.*
 2. *Aff need not present a specific plan or solution, though they may. However, Aff must do more than simply show a harm or reason to regret the issue in question, as most issues will have two sides. In the absence of a specific alternative proposed by Aff, the implicit alternative is a world in which the issue in question does not exist or is much diminished. To win, Aff must show that such a world is on balance better, good and bad aspects considered. (Neg must show the opposite.)*
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Space tourism

From Wikipedia, the free encyclopedia

Space tourism is human space travel for recreational purposes.[1] There are several different types of space tourism, including orbital, suborbital and lunar space tourism. Work also continues towards developing suborbital space tourism vehicles. This is being done by aerospace companies like Blue Origin and Virgin Galactic. In addition, SpaceX (an aerospace manufacturer) announced in 2018 that they are planning on sending space tourists, including Yusaku Maezawa, on a free-return trajectory around the Moon on the Starship.[2][3]

During the period from 2001 to 2009, seven space tourists made eight space flights aboard a Russian Soyuz spacecraft to the International Space Station, brokered by Space Adventures in conjunction with Roscosmos and RSC Energia. The publicized price was in the range of US\$20–25 million per trip. Some space tourists have signed contracts with third parties to conduct certain research activities while in orbit. By 2007, space tourism was thought to be one of the earliest markets that would emerge for commercial spaceflight.[4]: 11

Russia halted orbital space tourism in 2010 due to the increase in the International Space Station crew size, using the seats for expedition crews that would previously have been sold to paying spaceflight participants.[5][6] Orbital tourist flights were set to resume in 2015 but the one planned was postponed indefinitely and none have occurred since 2009.[7]

On June 7, 2019, NASA announced that starting in 2020, the organization aims to start allowing private astronauts to go on the International Space Station, with the use of the SpaceX Crew Dragon spacecraft and the Boeing Starliner spacecraft for public astronauts, which is planned to be priced at 35,000 USD per day for one astronaut,[8] and an estimated 50 million USD for the ride there and back.[9]

The Case Against Space Tourism

The Wall Street Journal, By Kevin Cook, July 22, 2021 1:20 pm ET

Professional astronauts have a full understanding of the risks. Civilians like Christa McAuliffe don't.

Jeff Bezos' Blue Origin rocket ship and Richard Branson's Virgin Galactic spaceplane performed flawlessly during brief, newsworthy flights this month that seemed fun and even inspiring. Both men hope their feats will help usher in a new era in which ordinary people can enjoy the wonders of spaceflight. Elon Musk's SpaceX is planning a civilian launch later this year. "Welcome to the dawn of a new space age," Mr. Branson announced after he landed.

The intrepid astro-billionaires admit there are risks involved, but they don't dwell on them. So far only Mr. Musk, whose company is widely admired by NASA insiders, has emphasized the risks. Speaking of his plans to send crews to Mars before the end of the decade, he said, "a bunch of people will probably die in the beginning." Mr. Musk is right. Space travel is dangerous, and a question worth asking is: How many will die?

The last time there was talk about sending an ordinary person into space, NASA was doing the talking. In 1985 Christa McAuliffe beat out more than 11,000 other applicants to win a seat on the space shuttle Challenger. Almost overnight, she became a national celebrity: America's teacher in space.

NASA had a journalist-in-space program ready to go, with applicants including Walter Cronkite and Norman Mailer. "They are probably taking a journalist on the principle that Earth could not but be improved having one fewer on it," George Will quipped at the time.

When reporters asked McAuliffe whether she was nervous about rocketing into orbit, she repeated what she had been told: that the shuttle was as safe as a passenger jet. In fact, like today's Blue Origin, SpaceX, and Virgin Galactic vehicles, the space shuttle was an engineering experiment in progress.

After several scrubs due to weather and technical glitches, Challenger blasted off on Jan. 28, 1986, one of the coldest mornings ever recorded at Cape Canaveral, Fla. The rubber O-rings that sealed the shuttle's million-pound rocket boosters didn't work as well in cold weather—a fact known to NASA's managers and engineers—but nobody shared that information with the crew.

The O-rings failed, leading to an explosion over Cape Canaveral that millions of Americans will never forget. McAuliffe and her six crewmates didn't die instantly; Challenger's crew compartment, sheared from the rest of the shuttle, rose for another 20 seconds, then fell for more than two minutes before crashing into the Atlantic at 207 miles an hour. During those excruciating minutes the crew behaved heroically, trying to save the mission and one another. But the space shuttle, despite its early successes, was an experimental vehicle. So are today's commercial spaceships.

Yet wealthy hobbyists are lining up to ride in them. One bidder paid \$28 million to join Mr. Bezos on a coming Blue Origin mission. Hundreds more have bid \$200,000 to \$250,000 for a ride on the next Virgin Galactic flight. One social-media influencer, whose seat will be paid for by her employer, the International Institute for Astronautical Sciences, claims the near future of space travel will be about more than “sending engineers to space; we're going to be sending poets and communicators and artists and athletes.” There is talk of in-flight ping-pong and champagne.

There is little talk of the Challenger or the Columbia, which burned up on re-entry in 2003, killing seven more astronauts. Both disasters led to investigations and reforms, and by the time the shuttle program ended in 2011, U.S. astronauts had helped build the International Space Station, the shuttle era's crowning achievement. All three of today's space-tourism firms plan to zoom clients to the space station and back no later than next year.

It is easy to imagine a near future in which these companies are moving quickly to outdo one another. Corporate concerns might soon match the pressures NASA executives faced when they chose to launch Challenger on the worst possible day. During a teleconference the night before Challenger's launch, engineers recommended waiting for warmer weather. One boss told a holdout to “take off your engineering hat and put on your management hat.” The engineers caved in; the shuttle blew up.

What happens if the billionaires' early triumphs lead to a similar sort of overconfidence and corner-cutting? Suppose one of their companies takes the lead in citizen spacefaring. How intense will the pressure on the others become? How soon might some harried executive say, “SpaceX is launching today. How long do you want me to wait?” That's a prescription for the kind of decision-making that gets astronauts—or ordinary people in space suits—killed.

“Nobody expects the worst to happen,” Mike Ciannilli, a NASA engineer who helped comb the Texas countryside for debris from Columbia, tells me. He now leads a lessons-learned program for the agency, giving talks in hope of preventing the next space disaster.

Mr. Ciannilli supports the new launches. “NASA's not the only game in town anymore,” he says. At the same time he urges companies to remember that spaceships are the most complex and dangerous machines ever built, and to take precautions to avoid the hubris that helped destroy Challenger and Columbia. Without constant diligence, he says, “Murphy's Law is gonna get you.” And when Murphy's Law strikes again, its unlucky victims should be professional astronauts with a full understanding of the risks.

[Ed. note: Murphy's Law: Anything that can go wrong will go wrong.]

Mr. Cook is author of “The Burning Blue: The Untold Story of Christa McAuliffe and NASA's Challenger Disaster.”

Why Space Tourism? Because It Operates Outside of NASA

The Wall Street Journal, By Holman W. Jenkins, Jr., July 23, 2021

But fans of space exploration know big government will likely always take the lead.

These have been heady days for would-be space tourists, a self-funding cargo that spacecraft designer Burt Rutan once joked can be reproduced with unskilled labor around the house.

Self-funding is the key term, a synonym for “not dependent on NASA.”

Mr. Rutan was the brains behind Virgin Galactic founder Richard Branson's space plane, a first in two ways. Mr. Rutan's original model in 2004 received the Federal Aviation Administration's first commercial human spaceflight license. And Mr. Branson used a later model this month to beat Jeff Bezos to an imaginary line marking the beginnings of outer space.

Mr. Branson might be said to proceed in the freebooting tradition of the East India Company. The private sector pursues its own aims and government follows. Mr. Bezos and SpaceX founder Elon Musk, without the least disrespect, are

government contractors in waiting. The things many of us dream of—Mars colonization, exploring the oceans of Europa, sending robot probes to nearby star systems—are public-sector work even if big pieces can be split off for private competition.

All hail Mr. Musk for forcing NASA and its pork-barreling congressional masters to recognize the cost-cutting benefits of private, reusable rocketry. He did so with his own money, impelling NASA for now to alter its business model in a way that may or may not stick.

All three billionaires—call them Messrs. B, B & M—deserve credit for reawakening public interest in space. The downside of the Musk-Bezos approach is also apparent. The two are locked in a dispute, currently before the Government Accountability Office, over a contract for NASA's new lunar lander.

My tiny asterisk in this history was a 2004 column entitled “The ‘Final Frontier’ May Be a Senate Waste Basket,” helping to resurrect a bill requiring the FAA to facilitate private space ventures. A few years later, President Obama arrived as an enthusiast for NASA becoming a consumer of private services rather than doing everything in-house on a cost-plus basis. Then he met Bill Nelson, a Senate overseer from Florida, who forced down his throat a NASA heavy-lift rocket, the Space Launch System, which a decade later still hasn't flown and is laughably over budget.

When Mr. Nelson became the Biden administration's NASA chief in May, the Twitter response from former space officials and space policy experts might have stripped the atmosphere off a small planet. Mr. Nelson's other claim to fame, many recalled, was mandating himself a useless passenger on a 1986 shuttle flight. In his new job, he's already started trumpeting a Cold War space race with China, which some see as a prelude to redirecting as much of NASA's future budget back to its public-sector workforce as he can get away with.

Mr. Bezos said after his flight that suborbital tourism is a sideshow. His “New Shepard” rocket is overbuilt for the purpose and really directed toward lifting heavier payloads into orbit.

Ditto Mr. Musk. His Starship spacecraft and its associated Super Heavy Rocket, the current apples of his eye, have the U.S. government as their prime target customer.

Mr. Branson's aim is altogether different. His spaceship is essentially a two-stage winged aircraft. He looks beyond space tourism for the wealthy to suborbital transportation between cities. He would take passengers to the edge of space not for the purpose of setting them down where they started but halfway around the world.

Call this a longer bet, with routine supersonic travel preceding the space developments that many of us pine for. Mr. Musk is talking about Mars colonization within his lifetime (he wants to live to see it, after all) but Mr. Branson's implicit timeline is probably more realistic if less pleasing to those of us watching our biological clocks run down. For one thing, nowhere in sight is NASA's space-ready nuclear reactor, a likely requirement for the next big advance in space exploration.

In one respect, the future is already here. The punditry has converted itself into an algorithm, reflexively lamenting billionaire space jaunts in a way it never laments expenditures on beer nuts or electric-vehicle subsidies, though these monies could also be used to relieve human want.

A biblical figure once joked to one of his disciples: Stop worrying, you'll always have poor people to parade your compassion over. But life has other purposes too. A mammalian species lasts only about two million years in the fossil record. One thing we know is that a species tied to one planet is guaranteed to fail eventually.

Prince William criticises space race and tourism's new frontier

The Guardian, Thu 14 Oct 2021 03.48 EDT

Duke of Cambridge says world's greatest minds need to focus on trying to fix the Earth instead

The Duke of Cambridge has criticised the space race and space tourism, saying the world's greatest minds need to focus on trying to fix the Earth instead.

Prince William's comments, in an interview with Newscast on BBC Sounds, will be aired the day after William Shatner made history by becoming the oldest person in space.

The 90-year-old actor, known for his role as Captain James T Kirk in Star Trek, lifted off from the Texas desert on Wednesday in a rocket built by the Amazon founder Jeff Bezos's space travel company Blue Origin.

The prince, who was interviewed about the climate crisis ahead of his inaugural Earthshot prize awards, said: “We need some of the world's greatest brains and minds fixed on trying to repair this planet, not trying to find the next place to go and live.”

He also warned the attendees of the Cop26 summit, where world leaders will gather in Glasgow at the end of the month, against “clever speak, clever words but not enough action”.

“I think for Cop to communicate very clearly and very honestly what the problems are and what the solutions are going to be, is critical,” he said. “We can’t have more clever speak, clever words but not enough action.”

William expressed his concerns about a rise in climate anxiety in young people, and said it would be an “absolute disaster” if his eldest son, Prince George, was having to talk about the same issue in 30 years when it would be too late.

“We are seeing a rise in climate anxiety. Young people now are growing up where their futures are basically threatened the whole time. It’s very unnerving and it’s very anxiety making,” he said.

He added that his father, the Prince of Wales, who is known for his longstanding commitment to green issues, had a “really rough ride” when he first started talking about the climate crisis.

William, who was interviewed by the Newscast presenter Adam Fleming, said his late grandfather the Duke of Edinburgh had started the royal interest in environmental issues.

He said of Charles: “It’s been a hard road for him. My grandfather started off helping out WWF a long time ago with its nature work and biodiversity, and I think that my father’s sort of progressed that on and talked about climate change a lot more, very early on, before anyone else thought it was a topic.

“So yes, he’s had a really rough ride on that, and I think he’s been proven to being well ahead of the curve. Well beyond his time in warning about some of these dangers.

“But it shouldn’t be that there’s a third generation now coming along having to ramp it up even more. And you know, for me, it would be an absolute disaster if George is sat here talking to you or your successor, Adam, you know in like 30 years’ time, whatever, still saying the same thing, because by then we will be too late.”

He added that his viewpoint had changed since he had children: “I want the things that I’ve enjoyed – the outdoor life, nature, the environment – I want that to be there for my children, and not just my children but everyone else’s children.

“If we’re not careful we’re robbing from our children’s future through what we do now. And I think that’s not fair.”

William discussed his Earthshot prize, saying it was about trying to create action.

The U.S. Should Send a President to Space

The Wall Street Journal, By Christopher P. Mulder and Raphael J. Piliero, July 29, 2021

The new race with China demands lofty accomplishments.

The U.S. president has a responsibility to inspire and lead all Americans, and to set the example on the world stage. To comprehend that responsibility fully, he (or she) should personally view Earth from the highest possible vantage point—outer space.

When we think of journeying to space, the famous pilgrimages of Yuri Gagarin and Neil Armstrong often come to mind. Yet suborbital space is becoming increasingly accessible to nonastronauts. The recent flights by Richard Branson and Jeff Bezos on rockets their companies built demonstrated this dramatically.

The promise of private space enterprise should be harnessed by American leaders to gain an advantage in the space race with China. China has been active by landing a rover on Mars and achieving the first landing on the far side of the moon.

If the U.S. hopes to win this space race, public support will be crucial. Yet a recent Morning Consult poll shows Americans rank space 25th in a list of 26 priorities for the Biden administration. Americans aren’t inspired by space in the way they were in the 1950s and ’60s, when space travel thoroughly captured the American consciousness.

To rekindle the spirit of American adventure, a U.S. president should travel to space by the end of the decade. This will show that space is a priority for American leadership, and it will signal that the best has yet to come.

Historically, presidents have focused on aerospace technology. George Washington took a keen interest in hot-air balloons. In 1910 Theodore Roosevelt became the first president to fly in an airplane, and in 1957 Dwight Eisenhower became the first to fly in a helicopter. The presidential fascination with air travel became a passion for space travel, underscored by John F. Kennedy’s 1961 remarks charting a course to the moon.

To launch a U.S. president into space, NASA should form partnerships with the private sector, underscoring the unmatched entrepreneurial spirit of the U.S. The president should also take along the leader of a strong ally or partner like the U.K., France, Germany, Japan or India to show a unified front against China’s space aspirations.

Today’s space race is different from the space race Kennedy spoke of, but it is no less important. U.S. leadership will be essential in offering the potential for a rules-based international order to deter space conflict and bring prosperity to Earth. This will require high-profile, lofty accomplishments.

There has been a long and storied history of U.S. progress in space, and the 2020s should have a fitting capstone: the

first U.S. president in space.

Mr. Mulder is a lieutenant colonel in the U.S. Air Force. Mr. Piliero is a Fulbright scholar in Taiwan.

Five Takeaways From the Developing Space War Between China and the U.S.

The New York Times, By William J. Broad, Jan. 24, 2021

The Biden administration is inheriting the menace of Chinese antisatellite arms as well as an innovative way of trying to defuse the escalating threat.

The stars of the new space age include not only famous entrepreneurs but a rising generation of dreamers and doers. Small companies, developing states and even high schools now loft spacecraft into orbit.

But Beijing is intent on dominating the democratized space age. It is building ground-based lasers that can zap spacecraft and rehearsing cyberattacks meant to sever the Pentagon from its orbital fleets.

Seven years ago, Washington seized on a new strategy for strengthening the United States military's hand in a potential space war. The plan evolved during the Obama and Trump administrations and, it is expected to intensify under President Biden.

Here's how the fight over space got started and how it is now playing out:

How Space Became the Next 'Great Power' Contest Between the U.S. and China

The Biden administration faces not only waves of Chinese antisatellite weapons but a history of jumbled responses to the intensifying threat.

China is rushing to dominate space with powerful new weapons.

In 2007, China shattered one of its own derelict satellites into thousands of whirling shards, making global headlines. The message to Washington was clear: Beijing was a vigorous new rival.

China conducted about a dozen more tests after the 2007 foray. Some of the speeding warheads shot much higher, in theory putting most classes of American spacecraft at risk.

But Beijing has also sought to diversify its antisatellite force beyond warheads.

Cyberattacks emerged as a cheaper way for China to take out U.S. space fleets.

The insight was simple. Every aspect of American space power was controlled from the ground by powerful computers. If penetrated, the brains of Washington's space fleets could be degraded or destroyed. Moreover, such attacks were remarkably cheap compared to other antisatellite arms.

China began developing viruses to infect enemy computers and, in 2005, began to incorporate cyberattacks into its military exercises. Increasingly, its military doctrine called for paralyzing early attacks.

Washington is bolstering space entrepreneurs to thwart Beijing.

The idea is that advances in the commercial sector can do for U.S. space forces what Steve Jobs did for terrestrial gadgets. To counter the Chinese threat, the Obama administration sought to tap the breakthroughs of space innovators as a way to reinvigorate the military.

Washington pumped billions of dollars into commercial ventures like Elon Musk's SpaceX and Jeff Bezos's Blue Origin. The result was the development of swarms of tiny satellites as well as fleets of reusable rockets, innovations that were seen as making antisatellite targeting vastly more difficult if not impossible.

The Trump administration sought an offensive edge.

The Trump administration continued the Obama commercial strategy, though neither the White House nor the newly created Space Force publicly acknowledged its origin.

President Donald J. Trump also sought to acquire offensive arms. The Space Force took possession of its first offensive weapon, which fires beams of energy from sites on the ground to disrupt enemy spacecraft in orbit.

The Trump administration last year asked Congress for a start on what it called counter-space weapons, putting their expected cost at many hundreds of millions of dollars. The military's classified budget for the offensive abilities is said to run much higher.

The Biden administration aims for orbital resilience.

Lloyd J. Austin III, a retired four-star Army general who was confirmed last week as Mr. Biden's secretary of defense, told the Senate that he would keep a "laserlike focus" on maintaining and sharpening the U.S. "competitive edge" against China's increasingly powerful military. Among other things, he called for new American investment in "space-based platforms" and repeatedly referred to space as a war-fighting domain.

Mr. Austin cited a need for enhanced orbital resilience, as well as continued reliance on the innovations of space entrepreneurs as a means of strengthening the military's hand. The menacing new era, he said, highlighted the importance of "improving our war-fighting capability" in outer space. And he singled out China as "the pacing threat."

Six reasons why space tourism matters

www.bbc.com, By Richard Hollingham, 7th April 2014

Virgin Galactic's SpaceShipTwo could undertake missions for as little as \$250,000 a time (Nasa)

It's easy to dismiss plans to take paying customers into orbit as a pursuit for the rich. But our space correspondent explains how it could benefit all of us.

Right now, one of the most exciting space facilities in the world is a World War Two hangar in the Mojave Desert in California.

The wooden hangar belongs to Xcor, one of the start-up companies building rocket planes to fly tourists into space. In the hangar next door, you can glimpse Virgin Galactic's spaceplane, slung beneath its carrier aircraft. Further along the runway, Microsoft billionaire Paul Allen's company, Stratolaunch, is developing a new space launch system. Eleven other small space businesses are spread around the site at the Mojave Air and Space Port.

Later this year, Virgin aims to fly its first paying passengers into space. The experience will not come cheap. Virgin Galactic is charging \$250,000 for the privilege of experiencing five minutes of weightlessness; Xcor plans to charge \$95,000 for a ride in its two-seater rocket ship. The cost alone puts this fledgling space-tourism industry beyond the means of most of us.

So it is easy to dismiss the whole enterprise as private jets in space rather than benefits for all mankind (as BBC Future readers have done on our Facebook page). But having followed the development of the private space industry for the last 20 years, and after a recent visit to the Mojave Air and Space Port for a BBC radio programme, I thought it was worth outlining why I think space tourism matters.

1. It frees space ambitions from traditional burdens

The audacious plan to put men on the Moon was championed by politicians and backed with billions of taxpayer dollars. By the time men had actually stepped onto the lunar surface, Nasa's budget was already being cut. Subsequent US, Russian and European space programmes – from the Shuttle to the International Space Station (ISS) – have suffered from political compromise and lack of ambition.

Private spaceflight, on the other hand, is unburdened by the favour of taxpayers or whims of politicians. If the company can raise the cash, it can build a spacecraft. Inevitably, this free market favours people who already have a lot of money. But that is not true of all the companies in the private space business.

"We don't have a multi-billionaire funding us," admits the CEO of Xcor, Jeff Greason. For him, building a sub-orbital tourist craft is part of a long-term strategy. "We started examining how a fully-reusable orbital system would look and realised we would need to develop earlier versions of that to learn how to build them," he says. "Those earlier versions also have to make money."

2. Failure is now an option

Nasa is forever burdened with the phrase "failure is not an option". Private companies have no such restrictions until the money runs out.

The entrance to the Mojave Air and Space Port is dominated by a reminder that not all space projects succeed. Resembling a giant white traffic cone, the Rotary Rocket is one of the most peculiar flying machines ever built – probably best described as half-helicopter, half-spacecraft, and if you were being cruel, you might also call the concept half-baked.

It was one of the first spacecraft to be developed at Mojave and, in 1999, made some brief atmospheric test flights. The engineering proved sound but funding problems caused the company to fold. Today it is gathering desert dust in a small memorial garden.

One person who worked on the Rotary is Kevin Mickey, President of Scaled Composites – the company now building Virgin's spaceplane. "I look at this, and I'm proud of it," says Mickey, as we stand beside the white conical spacecraft.

"One of the hurdles in today's society is an intolerance for risk and failure and if you are truly going to innovate, you are going to fail sometimes," he says. The carbon composite materials technology that went into the Rotary is now being adapted for Scaled Composite's aircraft and spaceplanes, so the expertise has not totally gone to waste.

3. It will inspire a new generation of engineers

The spaceport looks more like a college campus than a space centre. Take, for example, 26-year-old Xcor engineer,

Jeremy Voigt. He proudly shows me one of the rocket engines he is helping to develop: currently, it's a mass of pipes, wires and valves.

"It's the engineer's dream job," he says. "Most engineers sit behind a desk all day, I don't. I get to come out here in the shop, turn wrenches and fire rocket engines."

He looks around the crowded hangar, crammed with bits of rocket motor and partially constructed spaceplane. "If I was at Nasa, I would be part of a large team of engineers working on something," he says excitedly. "Here I actually lead the rocket test, I get to push the button."

The way of working at Mojave, in small teams with limited resources, is completely different to the way the space agencies work. Many people compare what is going on at Mojave with the early days of Silicon Valley and it is easy to draw parallels between the garage where Steve Jobs and Steve Wozniak built the first Apple computer, and the Xcor workshop. Maybe the young engineers here will have equally world-changing effects.

4. The cost of reaching space will go down

Right now, if you want to launch a satellite, it will cost upwards of \$12m and that is before the compulsory insurance (which can sometimes double the price). Not only can conventional space rockets only be used once, they are extremely expensive to launch – and there is limited competition.

Compare that with the \$250,000 cost of a flight on the reusable Virgin spaceplane. Scientific institutions have already signed up to fly experiments on these sub-orbital flights. If the next generation of space planes can reach orbit then that will massively reduce the cost of getting into space.

This means we will be able to launch satellites, spacecraft and space exploration missions for a fraction of the cost. The final frontier could finally become economically viable to a lot more people.

It is certainly something that gets CEO of Virgin Galactic and ex-Nasa employee, George Whitesides excited. "By lowering the cost of space access, we'll be able to do things like sending little nanosats all over the Solar System and do all this incredible science, that is so expensive now," he says. "If we are able to tackle some of these challenges by demonstrating access to space technologies, then I think that will be profound."

5. Hypersonic travel could become a possibility

Remember the idea that you can take off from London, fly into space and touch down in San Francisco an hour or so later? When discussing technologies that are promised but never quite deliver, a close runner-up behind flying cars has to be so-called sub-orbital point-to-point travel. Could the space tourism companies at Mojave finally help make this dream a reality? George Whitesides thinks so: "This is fundamentally transformational for humanity," he tells me.

"I really think of our customers as pioneers, opening up the new frontier," he says. "For one thing, everyone would like to get there faster, another reason is that you're not chugging through the atmosphere for 12 hours, so there could be environmental benefits to that."

But few people are going to pay \$250,000, or even \$95,000, for a flight to San Francisco, however fast. Space tourism companies counter with the argument that as the technology evolves, costs will inevitably come down. The history of aviation suggests this is indeed the case.

"Most technologies at the front end are funded by wealthier folks," says Whitesides. "If you go back to the dawn of commercial aviation, the real adjusted cost of crossing the Atlantic was \$10,000 or if you look at the early cellphones they were thousands of dollars, now you can get them for free if you sign up for a contract."

Right now, the space companies are only on their first-generation rocket planes. By the 10th generation, point-to-point travel via space may become a reality.

6. It will provide a new view of our planet

It is widely accepted that one of the greatest achievements of the Apollo Moon programme was the view of the Earth from space. Apollo 8 astronaut Bill Anders summed up the impact of the pictures captured by his mission: "We came all this way to explore the Moon," he said, "and the most important thing is that we discovered the Earth". The images put us in our place, a blue marble against the backdrop of nothingness.

Every astronaut I have interviewed talks about how seeing the Earth from space changed their view of the world. So imagine what would happen if we started sending business and political leaders into space and back? Would that view of the world change them in the way it affected astronauts? And as a result, could it influence the decisions they make on border disputes, pollution or climate change?

Jeff Bezos and Other Space Tourists Fly at Their Own Risk

The Wall Street Journal, By Matt Grossman and Doug Cameron, June 10, 2021 11:00 pm ET

Suborbital travel isn't subject to same rules as commercial flight

When Jeff Bezos climbs into the New Shepard capsule for its first passenger trip to space next month, his safety will be almost entirely in the hands of the spaceflight company he founded two decades ago.

Mr. Bezos plans to join the small band of tourists who have flown in space as the emerging industry prepares to launch hundreds of people aloft. For now, they aren't protected by the meticulous federal safety regulations that govern commercial air travel.

Passengers planning a ride on the New Shepard must sign a form waiving their right to sue Mr. Bezos's Blue Origin LLC in the event of an accident. Richard Branson's Virgin Galactic Holdings Inc., SPCE -4.89% which plans to send paying passengers on its space plane as early as next year, requires a similar step.

Congress agreed in 2004 to let the space-tourism industry self-regulate to speed its preparations for passenger flights. Years of delays, including an accident that killed a Virgin Galactic test pilot in 2014, have pushed back the start of flights for fare-paying passengers. The policy has been extended several times and now runs until October 2023.

The Federal Aviation Administration's jurisdiction is limited to protecting public safety and the environment during launches and re-entries, a spokesman for the agency said. "Congress has not allowed the FAA to extend its authority to the safety of crew or space flight participants," the spokesman said.

Regulators, lawmakers and industry executives are debating whether to introduce tougher rules, such as requiring passengers to be trained for the rigors of reaching the edge of space. The companies already offer some training for their short flights, which include periods of high G-forces and the possible disorientation that can come with weightlessness.

Blue Origin and Virgin Galactic have said they are following rigorous testing and safety standards as they prepare to open ticket sales. Analysts expect flights to cost as much as \$500,000 for a brief up-and-down that includes several minutes of weightlessness. Blue Origin's flights take about 10 minutes. Virgin Galactic's take more than two hours because the spacecraft is launched from an airplane that must first climb to a high altitude.

Mr. Bezos will be joined on the planned July 20 flight by his brother, Mark Bezos, and the winner of a charity auction due to conclude Saturday.

Blue Origin said more than 6,000 bidders from 143 countries have taken part in the auction so far. The highest bid stood at \$4.8 million by Thursday evening. The company, like Virgin Galactic, hasn't commented on future ticket prices.

Blue Origin said would-be passengers will have to be able to run to the top of the company's launch tower—about seven flights of stairs—in 90 seconds and fit into a spacesuit. Beyond that, it won't require passengers to take a medical exam before flying, referring them to their personal doctor for any fitness concerns. A Virgin Galactic official said flight preparations include a medical consultation.

The companies provide training over two or three days. Virgin Galactic's preparation includes sessions with its pilots, instruction on weightlessness and time in a cabin mock-up. The company offers passengers optional flights in aircraft that simulate zero gravity, as well as time in a centrifuge that replicates some of the forces astronauts experience during flight.

Blue Origin said traveling in its spacecraft requires minimal training. "It's familiarization of the safety features and preparations to travel to space on the fully autonomous New Shepard rocket," said a spokeswoman.

The cost of space launches means the rockets and capsules have been tested much less exhaustively in flight than commercial aircraft, which are sent on thousands of hours of test flights before carrying paying customers.

Virgin Galactic's testing program suffered an in-flight breakup in 2014, killing a test pilot. Accident investigators attributed the crash to design defects by Scaled Composites LLC, the company that manufactured the spacecraft, that allowed a pilot's error to lead to an accident.

A Virgin Galactic spokeswoman said Virgin Galactic has since taken over design and manufacturing of the spacecraft.

Aside from risks related to the spacecraft, some passengers will probably experience more intense medical issues than the mild ear effects familiar from airline flights, said Dr. Jeffrey Jones, a flight surgeon who has worked with astronauts at the National Aeronautics and Space Administration. Many people vomit during their first encounter with weightlessness, he said, and passengers can also get injured if they aren't properly strapped in when gravity returns.

"Passengers are part of the safety system. They need to know what's going to happen," said David Allen, head of operations at Blue Sky Flight Training LLC, which has helped dozens of would-be astronauts prepare for space.
