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Around the World in 60 Minutes (Or Less!)

BY Kaitlyn Johnson

IN LATE SEPTEMBER 2017 at the International Aeronautical Conference, SpaceX CEO Elon Musk announced updates to SpaceX's 'Big *Falcon* Rocket' (BFR) and its suborbital transportation capabilities, as well as plans for the BFR to become SpaceX's primary interplanetary vehicle.[1] However exciting, the BFR is not the first proposal for suborbital transportation and many are skeptical of its fruition, having heard these grand dreams before.

On February 3, 1986, only a few days after the Challenger accident, in a State of the Union address, U.S. President Ronald Reagan announced a "new Orient Express that could, by the end of the next decade, take off from Dulles Airport, accelerate up to 25 times the speed of sound, attaining low Earth orbit or flying to Tokyo within 2 hours."[2] In this speech, President Reagan was referring to the National Aero-Space Plane (NASP), also known as NASA's Rockwell X-30 'Space Plane,' which was a public follow-on project to DARPA's confidential Copper Canyon program.[3] The NASP was designed to be reusable, operate off of conventional runways, and allow for a rapid turnaround; but at the time of the President's speech, was not intended to be an 'Orient Express' in space.[4] A full-scale aircraft was never constructed, as Congress ended funding for the NASP in 1994.[5]

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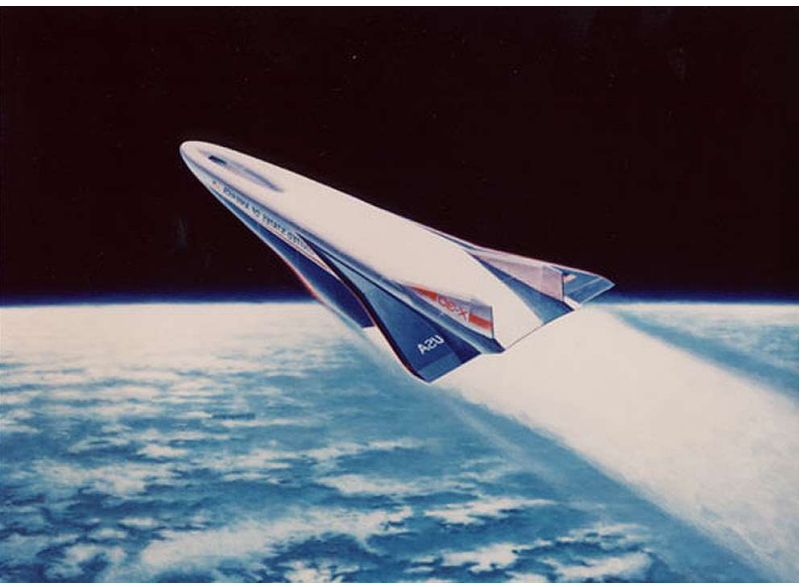

Rockwell X-30 / NASA

More technologies capable of suborbital transportation are currently being developed. Virgin Galactic has been developing their reusable SpaceShipTwo for almost a decade, which is planned to carry up to six passengers and two pilots on any given flight. Blue Origin also plans to send passengers into space using their New Shepard Vehicle, which is similarly designed to carry six passengers into suborbital flight. In collaboration with NASA's Commercial Crew program, Sierra Nevada has been developing and testing their Dream Chaser spacecraft that is capable of both launching cargo and up to seven crewmembers into low Earth orbit (LEO). Also in collaboration the same NASA program, Boeing has been developing their CST-100 Starliner capsule to ferry cargo or up to seven passengers to similar altitudes. All of these companies have the potential to fundamentally change long-distance, commercial transportation. However, in order for their plans to be viable, Blue Origin and Boeing may have to reconfigure their vehicles to land on small targets in order for rapid turnaround. Currently the two companies' vehicles land within a large specified region, not a target the size of a landing pad. Virgin Galactic, Sierra Nevada, and SpaceX, however, are already configured to land in a way that allows for a relatively quick turnaround.

SpaceX's announcement is certainly unique in the size and scope of the proposal. Musk's September announcement claimed BFR transportation from New York to Shanghai would take only 39 minutes and even the longest flights were still estimated to be under an hour. Furthermore, Musk claimed to have a plan to reduce costs down to the price of airline tickets (albeit, probably very expensive airline ticket prices).[6] If achieved, it is doubtful that other companies will be able to easily match SpaceX's suggested price point. For reference, a 2.5 hour suborbital flight on Virgin Galactic's SpaceShipTwo currently costs about $250,000 per person.[7] In November 2017, SpaceX President Gwynne Shotwell noted that the U.S. Air Force was already supporting the project through their funding for the Raptor engine, which will power the BFR. Additionally, Shotwell mentioned that she expects further funding for the BFR from the U.S. Government due to the BFR's unique reusable capabilities.[8]

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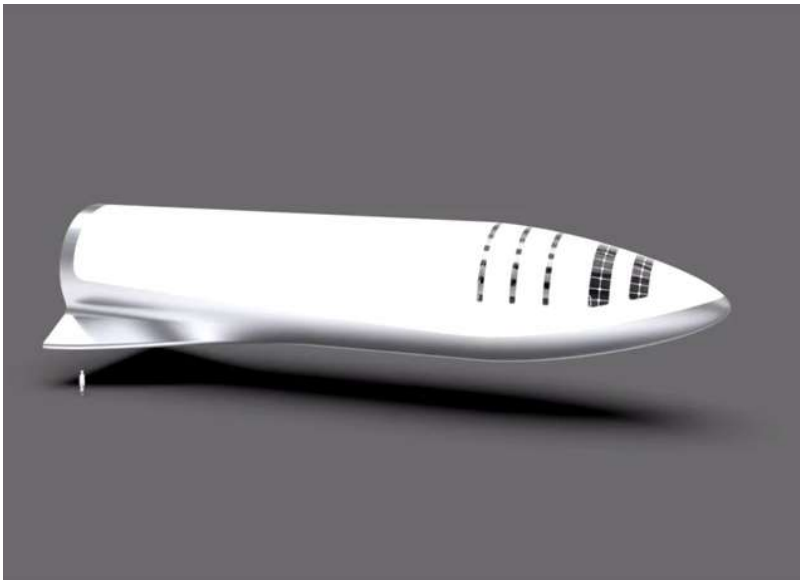
If suborbital transportation becomes a reality, personnel and supplies could be delivered to virtually any location on the Earth within 30 to 45 minutes. As commercial space companies near full development and operation of these suborbital transportation vehicles, the U.S. Government needs to continue to work with these companies to develop common safety regulations for operation. The American Space Commerce Free Enterprise Act of 2017 is a step in the right direction in creating flexible regulations and accountability within this further-developing space economy, but it may not be enough to encourage and

support the growth of these new technologies and innovations. The United States is now teetering on the edge of a new form of commercial transportation, and like transportation systems already in use, the U.S. Government needs to ensure operators' and passengers' safety. Policymakers cannot afford to wait to impose regulations on these companies after their vehicles are fully operational. With so many different space transportation vehicles and methods of operation, this is not an easy task. Further complicating regulations, the way space transportation will be produced and operated is very different from trains, cars, or aircraft. For example, currently commercial airliners are produced by either Airbus or Boeing, are then purchased by Delta, United Airlines, Frontier, etc., and then operated by these individual companies. For spacecraft, SpaceX or Blue Origin plan to both produce and operate their own private vehicles. This one-company approach presents a somewhat unique environment to introduce common standards and regulations.

Notwithstanding the immense commercial and public appeal these technologies may have, for the U.S. government to be able to utilize such capabilities, it would need to purchase transportation as a service from one of these companies. Purchasing suborbital transportation as a service would most likely be similar to how the U.S. Government currently launches satellites into orbit. Suborbital space transportation as a service would be little different from current operations for transporting equipment across the world. Launching inanimate objects, however sensitive or expensive, is different than launching soldiers or evacuating personnel from dangerous areas.

Policymakers should also consider the unique opportunities that suborbital space transportation could provide for the U.S. Government, and especially the U.S. Military, for both transportation of cargo and personnel. If suborbital transportation becomes a reality, personnel and supplies could be delivered to virtually any location on the Earth within 30 to 45 minutes. This could be critical for sending supplies, food, medics, and military personnel.



Big Falcon Rocket / SpaceX

After a natural disaster, suborbital transportation could dramatically reduce crisis response times, and save lives on the ground. For the military, this means that time-critical supplies, like spare parts or ammunition, could be rapidly deployed to forward bases directly from the United States. Small numbers of special operations forces could also be sent to locations around the globe in order to more quickly carry out time-sensitive missions. If a U.S. embassy, consulate, or base came under attack, special operations personnel could be rapidly deployed to help secure the area. If Musk's time estimations are correct, support could be provided in under an hour, critically saving lives.[9]

With the advent of suborbital transportation technologies, the U.S. Government should further work with industry to begin developing the regulations and standards necessary for such activities.

Notes

[1] SpaceX, "Making Life Multiplanetary," video, 43:47, September 28, 2017, https://youtu.be/S5V7R_se1Xc.

[2] Ronald Reagan, "Address Before a Joint Session of Congress on the State of the Union" (speech, Washington, DC, February 4, 1986), *The American Presidency Project*, http://www.presidency.ucsb.edu/ws/index.php?pid=36646.

[3] Mark Wade, "X-30," *Astronautix.com*, http://www.astronautix.com/x/x-30.html.

[4] Round Trip to Orbit: Human Spaceflight Alternatives (Washington, DC: Congress of the United States, Office of Technology Assessment, 1989), 69, http://govinfo.library.unt.edu/ota/Ota_2/DATA/1989/8927.PDF.

[5] "Rockwell X-30," *NASA*, February 12, 2016, https://www.nasa.gov/centers/armstrong/history/experimental_aircraft/X-30.html.

[6] SpaceX, "Making Life Multiplanetary."

[7] "Fly with Us," *Virgin Galactic*, https://www.virgingalactic.com/human-spaceflight/fly-with-us/.

[8] Jeff Foust, "SpaceX expects government support for development of BFR launch system," *SpaceNews.com*, November 16, 2017, http://spacenews.com/spacex-expects-government-support-for-development-of-bfr-launch-system/.

[9] Todd Harrison et al., Implications of Ultra-Low-Cost Access to Space (Washington, DC: Center for Strategic and International Studies, 2017), p. 41-42.

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