# Will 2016 be the year Elon Musk reveals his Mars colonial transporter plans?

4 January 2016, by Nancy Atkinson

Musk wants to see his "Red Dragon" on the surface of Mars within the next 20 years. Credit: SpaceX

There are several space stories we're anticipating for 2016 but one story might appear—to some—to belong in the realm of science fiction: sometime in the coming year Elon Musk will likely reveal his plans for colonizing Mars.

Early in 2015, Musk hinted that he would be publicly disclosing his strategies for the Mars Colonial Transport system sometime in late 2015, but then later said the announcement would come in 2016.

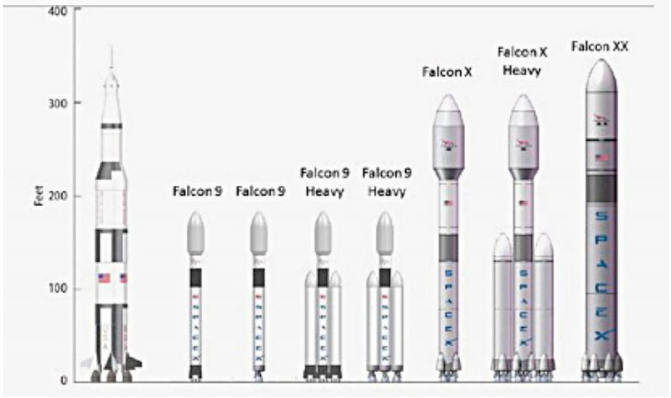
"The Mars transport system will be a completely new architecture," Musk said during a Reddit AMA in January 2015, replying to a question about the development of MCT. " *am hoping to present that towards the end of this year. Good thing we didn't do it sooner, as we have learned a huge amount from Falcon and Dragon."*

**Big Rockets**

As far as any details, Musk only said that he wants to be able to send 100 colonists to Mars at a time, and the "goal is 100 metric tons of useful payload to the surface of Mars. This obviously requires a very big spaceship and booster system."

He has supposedly dubbed the rocket the BFR (for Big F'n Rocket) and the spaceship similarly as BFS.

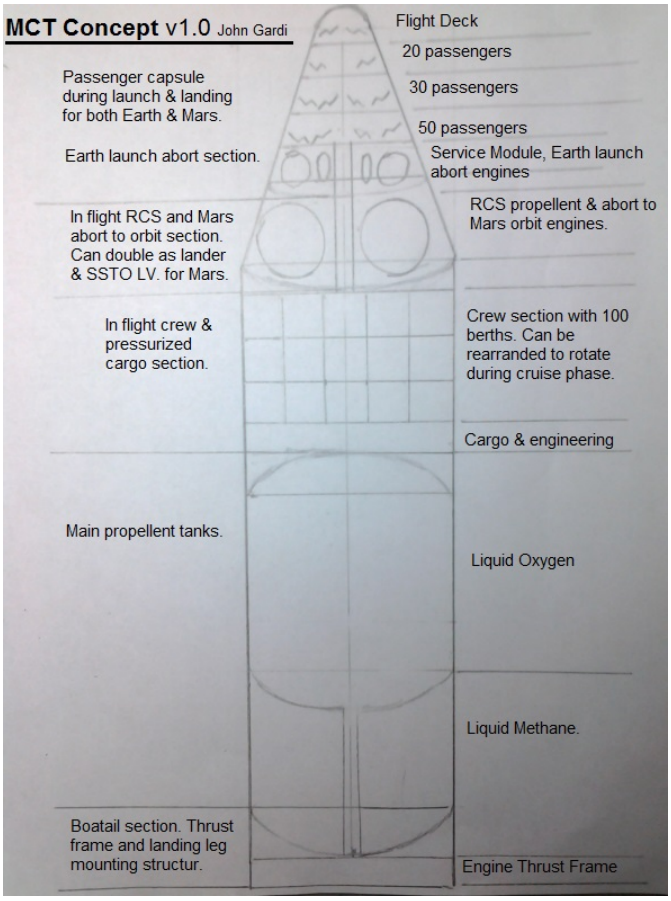
And he wants it to be reusable, which Musk and SpaceX have said is the key to making human life multiplanetary. The recent successful return and vertical landing of the Falcon 9's first stage makes that closer to reality than ever.




The future line-up of Falcon rockets is compared to the famous NASA Saturn V. The first Falcon Heavy launch is planned for 2015. Raptor engines may replace and upgrade Heavy then lead to Falcon X, Falcon X Heavy and Falcon XX. The Falcon X 1st stage would have half the thrust of a Saturn V, Falcon X Heavy and XX would exceed a Saturn V's thrust by nearly 50%. Credit: SpaceX, 2010

While SpaceX has no publicly shared concept illustrations as of yet, a few enthusiasts on the web have shared their visions of MCT, such as this discussion on Reddit , and the drawing below by engineer John Gardi, who recently proposed his ideas for the MCT on Reddit.

Most online discussions describe the MCT as an interplanetary ferry, with the spaceship built on the ground and launched into orbit in one piece and perhaps refueled in low Earth orbit. The transporter could be powered by Raptor engines, which are cryogenic methane-fueled rocket engines rumored to be under development by SpaceX.




A sketch shows how the top section of the Mars Colonial Transporter might be configured. Credit: John Gardi

### The Challenge of Landing Large Payloads on Mars

While the big rocket and spaceship may seem to be a big hurdle, an even larger challenge is how to land a payload of 100 metric tons with 100 colonists, as Musk proposes, on Mars surface.

As we've discussed previously, there is a "Supersonic Transition Problem" at Mars. Mars' thin atmosphere does not provide an enough aerodynamics to land a large vehicle like we can on Earth, but it is thick enough that thrusters such as what was used by the Apollo landers can't be used without encountering aerodynamic problems such as sheering and incredible stress on the vehicle.

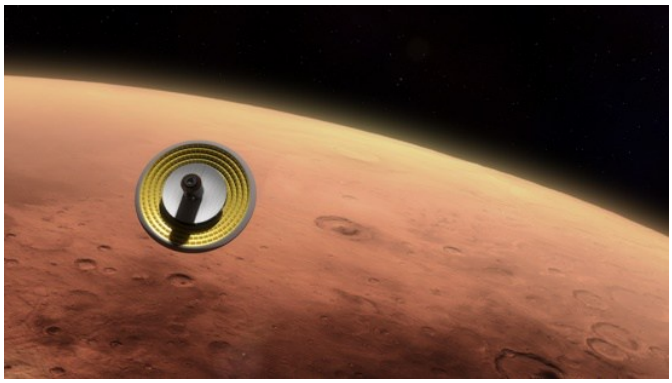
Another fan-based illustration of the modular sections of John Gardi's MCT concept sitting on the surface of Mars. Credit: George Worthington

"Unique to Mars, there is a velocity-altitude gap below Mach 5," explained Rob Manning from the Jet Propulsion Laboratory in our article from 2007. "The gap is between the delivery capability of large entry systems at Mars and the capability of super- and sub-sonic decelerator technologies to get below the speed of sound."

With current landing technology, a large, heavy human-sized vehicle streaking through Mars' thin, volatile atmosphere only has about 90 seconds to slow from Mach 5 to under Mach 1, change and re-orient itself from a being a spacecraft to a lander, deploy parachutes to slow down further, then use thrusters to translate to the landing site and gently touch down.

90 seconds is not enough time, and the airbags used for rovers like Spirit and Opportunity and even the Skycrane system used for the Curiosity rover can't be scaled up enough to land the size of

payloads needed for humans on Mars.



Artist’s rendering of a hypersonic inflatable aerodynamic decelerator technology concept. Credit: NASA

NASA has been addressing this problem to a small degree, and has tested out inflatable aeroshells that can provide enough aerodynamic drag to decelerate and deliver larger payloads. Called Hypersonic Inflatable Aerodynamic Decelerator (HIAD), this is the best hope on the horizon for landing large payloads on Mars.

The Inflatable Reentry Vehicle Experiment (IRVE-3) was tested successfully in 2012. It was made of high tech fabric and inflated to create the shape and structure similar to a mushroom. When inflated, the IRVE-3 is about 10-ft (3 meter) in diameter, and is composed of a seven giant braided Kevlar rings stacked and lashed together – then covered by a thermal blanket made up of layers of heat resistant materials. These kinds of aeroshells can also generate lift, which would allow for additional slowing of the vehicle.

"NASA is currently developing and flight testing HIADs—a new class of relatively lightweight deployable aeroshells that could safely deliver more than 22 tons to the surface of Mars," said Steve Gaddis, GCD manager at NASA's Langley Research Center in a press release from NASA in September 2015.

NASA is expecting that a crewed spacecraft landing on Mars would weigh between 15 and 30 tons, and the space agency is looking for ideas through its Big Idea Challenge for how to create aeroshells big enough to do the job.

With current technology, landing the 100 metric tons that Musk envisions might be out of reach. But if there's someone who could figure it out and get it done, Elon Musk just might be that person.

Source: Universe Today