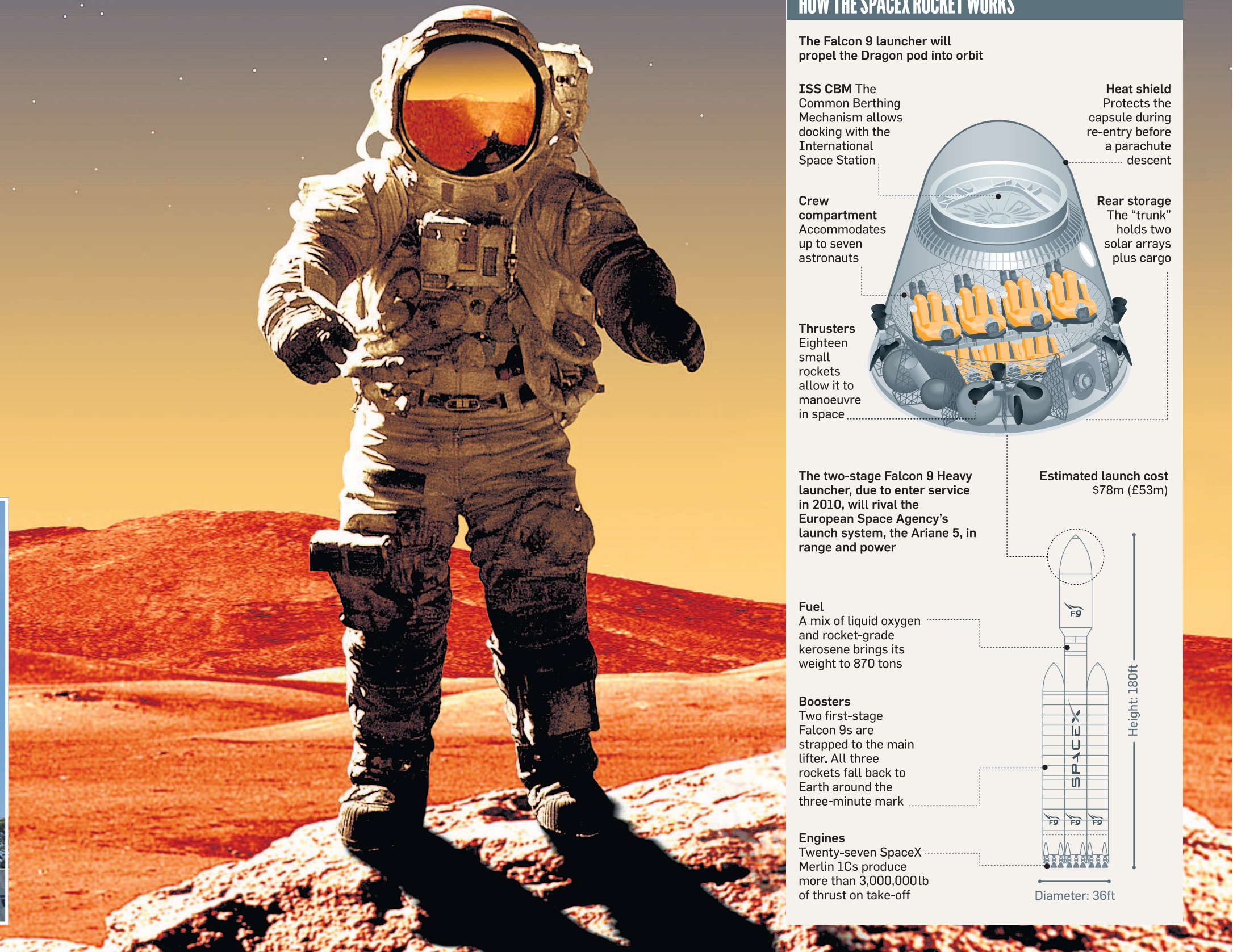


FORGET THE BUNGALOW, RETIRE TO MARS

Elon Musk, the tycoon behind PayPal, Tesla electric cars and the rocket company SpaceX, tells Mark Harris his next goal is to put life on the red planet

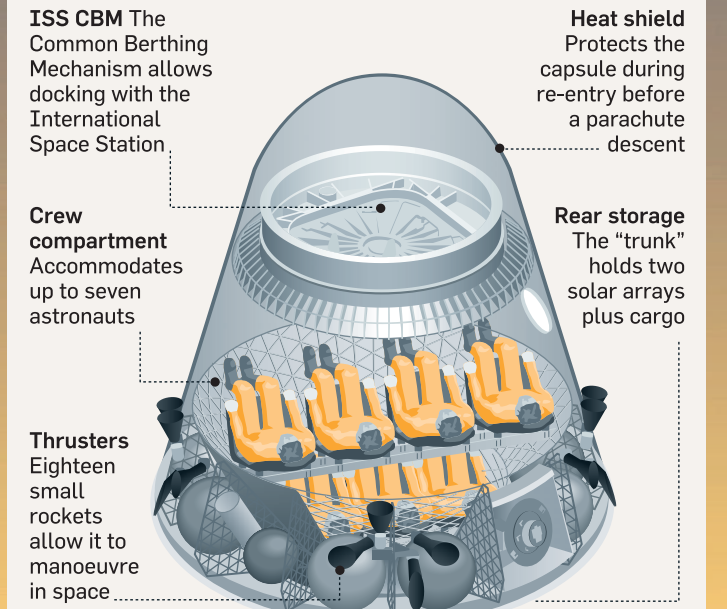


The Falcon 1 lifts off from Kwajalein Atoll in the Pacific to become the first privately built liquid-fuel rocket to go into orbit. Musk, inset, is now building the much bigger Falcon 9



HOW THE SPACEX ROCKET WORKS

The Falcon 9 launcher will propel the Dragon pod into orbit



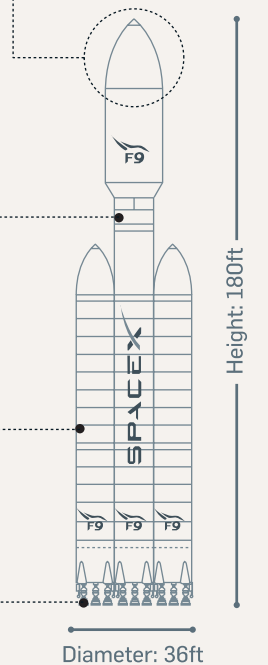
The two-stage Falcon 9 Heavy launcher, due to enter service in 2010, will rival the European Space Agency's launch system, the Ariane 5, in range and power

Estimated launch cost \$78m (£53m)

Fuel A mix of liquid oxygen and rocket-grade kerosene brings its weight to 870 tons

Boosters Two first-stage Falcon 9s are strapped to the main lifter. All three rockets fall back to Earth around the three-minute mark

Engines Twenty-seven SpaceX Merlin 1Cs produce more than 3,000,000lb of thrust on take-off



Photolibary.com/Dan Tufts/SpaceX/Eyevine

When someone looks you in the eye and tells you he's planning a supersonic electric plane and a retirement community on Mars, it can be hard to take him seriously.

It gets a little easier when you realise he is worth more than \$325m (£223m), owns the world's most successful electric sports car company, has put a rocket into orbit and was hired by NASA last month to help it keep the International Space Station supplied.

Elon Musk may have a name redolent of a Bond villain, but he is the poster child of the web generation, a Bill Gates for the 21st century. Like Gates, Musk made his first fortune in computing, designing the PayPal online payment system that now handles about 10% of global e-commerce. But where Gates stuck with software, Musk's ambitions are altogether more, well, out of this world.

I'm talking to Musk at the Los Angeles headquarters — No 1, Rocket Road, naturally — of his company Space Explor-

ation Technologies Corporation, universally known as SpaceX. With a Cylon (an alien robot from the TV show Battlestar Galactica) standing guard over the factory floor and geeks scooting around on bikes, SpaceX feels more like a web start-up than a company competing with the world's superpowers for extraterrestrial domination.

In an open-plan office just feet from rocket scientists designing his next generation of launch vehicles, Musk is frank about his long-term aims: "We are already the most competitive launch company in the world. My goal is to make it affordable enough and reliable enough to move life from Earth to other planets."

The 37-year-old is off to a flying start. In September, just six years after the company's formation and following three spectacular failed attempts, SpaceX became the first private company to shoot a liquid-fuelled rocket, the Falcon 1, into orbit.

SpaceX's achievement is all the more impressive because the young company designed the vehicle from scratch with

just a few hundred employees. "I'm very proud of everyone," says Musk. "Our rockets have a unique structural design and we're the first to use a new kind of injector on the engine."

Just weeks after the first flight of Falcon 1, SpaceX reached its next milestone: a test-firing of the larger Falcon 9 spacecraft in Texas. While the Falcon 1 will earn SpaceX money lobbing satellites into orbit, the Falcon 9 is the vehicle for Musk's interplanetary dreams.

This nine-engined multi-stage monster is 180ft long and can generate more than a million pounds of thrust. Its Dragon capsule will carry either five tons of cargo or a crew of up to seven astronauts. If the remaining tests go as smoothly, Falcon 9 will be lifting off from Cape Canaveral early this year — and could be in service with NASA just a year later.

It couldn't come a moment too soon. With the space shuttle due to retire next year and NASA's next generation launch vehicle, Ares, due no earlier than 2014, the Falcon 9 is desperately

'I do have an idea for an airplane — an electric supersonic jet'

needed to ferry astronauts to the International Space Station. In December NASA announced that SpaceX had won \$3.5 billion in contracts to begin delivering cargo to the station by next year.

"There are science modules on the space station that can't be used because the three people currently on board just spend all their time repairing stuff," says Musk. "If you can get six people up there, you can start to do real science. And that's what our system will enable, because Dragon can carry seven people to Soyuz's three. It's like a roomy SUV."

That's not to say that SpaceX is content merely to be NASA's chauffeur. "NASA will continue to be our biggest customer for a while but, with a recession looming, I think we're going to see some limits on its funding," says Musk. "[Barack] Obama's position on commercial space flight is very strong, even stronger than [George] Bush's. We're not going to see governments stop doing space altogether but private companies will account for the majority of space activity, probably within 10 years."

Musk has a history of playing rough and tumble with established businesses, and enthuses about his colleagues at PayPal. "We were competing against banks and eBay's own payment service. That's very difficult, it's like fighting a land war in Asia. It really was a very talented team." That team went on to help found some of today's biggest web businesses, including YouTube, Facebook, LinkedIn and Yelp. So will SpaceX spawn a similar industry of high-tech space start-ups?

Musk shakes his head emphatically. "SpaceX will be the industry. We are

continuing to grow. We will be at least 30-50% larger by the end of next year — and we'd be growing faster still if it wasn't for the economy."

He's also keen to distance himself from Virgin Galactic, the space tourism

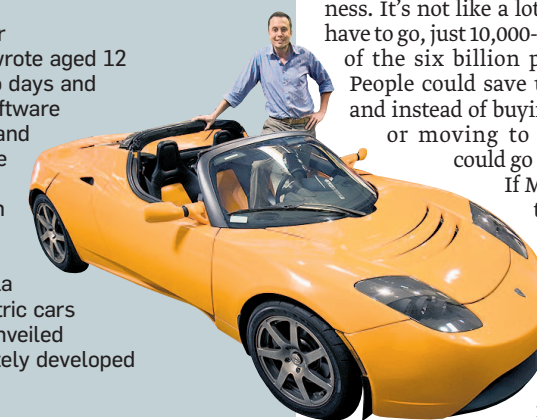
venture of fellow tycoon Sir Richard Branson. "Branson has shown that sub-orbital space flight is very much in demand. But SpaceX launches are more than an order of magnitude more difficult — getting to orbit takes about 70

times the energy of a sub-orbital tourist flight."

Musk has his own plans for humanity's future beyond the atmosphere. "We're looking at the commercialisation of space and the realisation of a permanent presence up there," he says with a gleam in his eye.

"If we could lower the cost of moving to Mars below a certain threshold, say \$2m, I could see that being a huge business. It's not like a lot of people would have to go, just 10,000-20,000 people out of the six billion people on Earth. People could save up all their lives and instead of buying a big house — or moving to Florida — they could go to Mars."

If Musk's future is in the stars, there is still plenty to keep him down to earth today. Tesla Motors, his electric sports car company, recently applied



WHO IS ELON MUSK?

- 1971** Born in South Africa to a Canadian mother
- 1983** Sells his first computer game, which he wrote aged 12
- 1995** Drops out of Stanford University after two days and co-founds Zip2, a provider of web-publishing software
- 1999** Sells Zip2 to Compaq for \$307m in cash and sets up X.Com, which later becomes PayPal, the giant electronic-payment system
- 2002** PayPal is acquired by eBay for \$1.5 billion — Musk was the largest shareholder. He then founds SpaceX
- 2003** Musk pumps funds into the fledgling Tesla Motors, which produces high-performance electric cars
- 2006** The Tesla Roadster sports car, right, is unveiled
- 2008** SpaceX launches Falcon 1, the first privately developed liquid-fuel rocket to orbit the Earth

for government funding and warned that without it, the development of its Model S saloon would have to be delayed. "Rumours of the demise of Tesla have been greatly exaggerated," says Musk. "When a company has been a golden child for so long, there's a tendency to want to tear it down. We've actually got twice as much money as we need to reach profitability."

The company is ramping up production of its 125mph Lotus Elise-inspired Roadster while slashing the price to \$60,000 (£41,000). I wonder how making the luxury Roadster fits with Musk's ideals of moving to a sustainable energy economy. "If we could have done a low-cost car right off the bat, we would have made that car," he says. "It's not out of a feeling that there are insufficient sports cars in the world that we have done this. Anything new is expensive. Now we could have made a \$109,000 sports car or we could have made a \$90,000 Honda Civic. Which do you think would have sold better?"

The Roadster's technology is about to trickle down to (very slightly) cheaper

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Musk famously owns (and still drives) the first Roadster that came off the production line. Will he also be on the first manned flight of the Falcon 9? The tycoon laughs. "I used to take a lot of personal risks but at this stage, with five kids and three companies, I'm risking more than just myself. I would like to go into space but I'll wait until the time is right."

What's next for the high-tech entrepreneur? Musk thinks for a moment before revealing his plans to combine his aeronautical and sustainable energy expertise. "I do have this idea for an airplane," he confesses, "an electric supersonic jet that takes off and lands vertically. That would be really cool."

Cooler than an affordable electric sports car? Cooler than your own space rocket and Martian colony? Maybe, but only just.