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Column

Pay your money, take your chance

Fatalities are an inevitable part of human spaceflight, and space tourism companies will have to face up to it, says Philip Ball.

Philip Ball

The tragic deaths of three workers in an explosion at the Mojave Air and Space Port in California should not be seen as the first fatalities of commercial spaceflight. The accident occurred during a test on a rocket-propulsion system for a private spacecraft, but this was an industrial accident, not a failure of aerospace engineering.

All the same, the accident will provoke questions about the safety of space tourism. The victims worked for Scaled Composites, a company commissioned to make a spacecraft for Richard Branson's Virgin Galactic, which intends to launch the first commercial space-tourism flights in 2009.

Scaled Composites is run by entrepreneur Burt Rutan, whose SpaceShipOne became the first privately funded craft to reach space in 2004, winning the US$10 million Ansari X Prize. Virgin Galactic aims to use a successor, SpaceShipTwo, to take space tourists 100 kilometres up into suborbital space at a cost of around $200,000 each.

Lethal science

Is SpaceShip One an airplane, or a spacecraft?

Scaled Composites / Mike Massee

Other aerospace engineers have emphasized that the accident, which seems to have been caused by a component of rocket fuel, does not reflect on spaceflight's intrinsic safety. They are right in a sense, although the incident seems likely to set back Virgin's plans.

Nevertheless, it's a reminder that rocket science is potentially lethal, and not just in flight. Three US astronauts died in a fire during supposedly routine launch-pad tests for the Apollo 1 mission in 1967.

Virgin insists that "safety is at the heart of the design" of their space-tourism programme. Perhaps it is time to ask what this means — or more precisely, how commercial space travel can reconcile the issues of safety, economic viability, accessibility, and projected traffic volume.

This is a complex equation, and no one yet has shown clearly how it might be solved. What, in short, is the business model for space tourism?

So far, the marketing strategy has relied on rhetoric that sounds stirring, but which makes it just as well these companies do not need a bank loan. The vision simply isn't coherent.

Not your average family holiday

On the one hand, there is the supposed aim of democratizing space. Commercial spacecraft will prise spaceflight from the grip of governments and make it available to everyone, says the X Prize Foundation. Virgin Galactic does not quite peddle the same libertarianism, but does suggest that "safety and cost issues [have] previously made space travel the preserve of the privileged few".

All of this sits uneasily with the fact that all space tourists so far have been multi-millionaires, and that $200,000 per ticket is not exactly your average family holiday.

Ah, but that will change as the industry grows, says Peter Diamandis, chairman of the X Prize Foundation: "Over the next decade we'll see the price of seats drop from $200,000 to $50,000, and perhaps as low as $25,000 per person." That's more than a luxury cruise, admittedly, but many might consider it for a once-in-a-lifetime experience.

I've yet to see an explanation of the economics. Diamandis has outlined the sums on the basis that "the cost of operating a mature transportation system — car, train, plane — is typically three times the cost of the fuel". But one reason that the Space Shuttle is so cripplingly expensive is that the — evidently imperfect — inspections and repairs needed after each flight are on a quite different scale from those of airlines.

Initially, space tourism will clearly depend on rich thrill-seekers. The early days of every new transportation technology have been hazardous, aviation especially so. Safety has had to wait for the industry to become established.

The history of manned spaceflight bears this out. The precise figures can be debated, because some astronauts have taken multiple flights, but as of 2003, 18 of the 430 humans who had flown in space died in accidents, a fatality rate of about 4%.

That's similar to the risk of climbing Everest. Such odds haven't stopped — mostly rich — people from scaling Everest, but former US astronaut Rick Hauck says that he wouldn't have flown had he known his chances of coming back alive.

Do or die

Looked at another way, manned spaceflight is 45,000 times more dangerous than commercial air travel. Admittedly, the comparison with the Apollo missions might be unfair — SpaceShipOne has been compared instead to the experimental US rocket plane X-15, which had only one fatal accident in 199 flights.

But however you look at it, Virgin Galactic is inventing a new technology, whereas Virgin Atlantic had decades of experience to draw on.

Advocates of human space travel might well respond with "Who cares?", because without risk, we'd never achieve anything. "It's the dreamers, it's the doers, it's the furry mammals who are evolved, take the risks, or die," says Diamandis. "That's what we stand for."

But hang on a minute. You can put safety first, or you can depend on do-or-die pioneers, but you can't have it both ways. If the argument is that a few foolhardy fat cats may have to perish so that the industry can become cheap and safe enough for the mass market, so be it. But I can't see that sales pitch working.

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