

Flying high

Sep 10th 2009 from *The Economist* print edition

America's government has no money for its human-spaceflight plans. The private sector has plenty

THE past, despite the disclaimer often found on advertisements for financial products, often can be a guide to the future. In the early days of flight, the American government awarded a series of guaranteed contracts for carrying airmail. This stimulated the growth of air travel to the point where passengers could be transported affordably and reliably, and was the root of airlines such as United and American. Those who wish to travel into space argue that the government should now be doing a similar thing for spaceflight, with its aerospace agency, NASA, playing the role of the post office. This week, there are signs that it might be about to.

At the behest of the president, NASA has been undergoing an independent review of its human-spaceflight plans. On September 8th the review committee delivered a summary report. That the agency does not have enough money to return to the moon is no surprise. What is more surprising is that the Augustine report (named after the committee's chairman, Norman Augustine) argues that NASA should stop travelling to the International Space Station in particular and to "low Earth orbit" in general. It should let the private sector do that instead, and focus its own efforts on more distant and difficult tasks.

Five years ago the idea that the private sector might have been capable of transporting cargo and people reliably into low Earth orbit was viewed as crazy. Much has happened since, and two things in particular. One was that Virgin Galactic, an upstart British firm, said it would develop a space-tourism business based around a craft that had cost only \$25m to build. The other was that an equally upstart American entrepreneur called Elon Musk, flush from his sale of PayPal, created a company called SpaceX (whose Falcon rocket is pictured above, dropping its first stage on its way into orbit). He said he wanted to make it cheaper to launch people into space and wanted, ultimately, to send a mission to Mars—but that he would start by launching satellites.

We have lift-off

It would be an understatement to say that both ventures were treated with scepticism. But they have now come far enough to be able to thumb their noses at the cynics. On September 3rd SpaceX signed a contract worth \$50m with ORBCOMM, a satellite-communications firm. The deal is to launch 18 satellites for ORBCOMM's network. Meanwhile, at the end of July, Aabar Investments, a sovereign-wealth fund based in Abu Dhabi, bought a 32% stake in Virgin Galactic for \$280m. Aabar was not just interested in space tourism. It was also keen on a proposal to use Virgin's White Knight launch system to put satellites into low Earth orbit. Will Whitehorn, Virgin Galactic's president, said that one of the things which attracted Aabar was the fact that White Knight (an aircraft which lifts to high altitude a rocket that can then take either passengers or satellites onwards into space) could be flown from Abu Dhabi.

Adam Baker of Surrey Satellite Technology, a British firm, knows a great deal about the economics of launching the kind of small satellites that Virgin's system might put into orbit. At the moment such satellites must either piggyback on the launch of a larger satellite or be launched rather expensively on their own rocket. A satellite costing only a few million dollars to build may thus cost \$20m-30m to launch. Dr Baker says the challenge is to get the cost of a small-satellite launcher down to a few million, and he is so excited by the possibilities that he is leaving his employer to join Virgin Galactic.

Dr Baker reckons that costs can be cut if the launch rocket uses the satellite's guidance computer instead of having its own, and if the satellite's built-in rocket motor is bolstered to do the work now performed

by a launch rocket's upper stage. That would mean satellite and launch rocket would have to be designed in tandem, so customers could not shop around for different launch vehicles. But Dr Baker is gambling that the system will be so cheap that this will not matter.

Over at SpaceX, developments have been just as interesting. Last year the company was given a \$1.6 billion contract to send cargo to the space station. (Orbital Sciences, a firm that has been around since 1982, was awarded \$1.9 billion to do the same.) This was the first time NASA had included private launch vehicles in its planning—the reality being that with the space shuttle about to retire the only other option was buying space on Russian rockets. The Augustine report now makes it more likely the government will dispense with NASA's services entirely in low Earth orbit and ask private firms to deliver crew to the station, as well as cargo.

Overall, the report is a healthy dose of reality for NASA. It warns that the agency's goals need to match its budget, and that it needs to internationalise its efforts, in order to make the most of its investments. For similar reasons the report tells NASA to extend the life of the space station. Abandoning the station in 2015, as is now the plan, would probably impair America's ability to lead international partnerships in the future. Spending a quarter of a century building something and then scuttling it looks bad, even if the useful science that has been done on board could be written up on the back of a postage stamp.

Finally, there is the moon. Should NASA go back? Mr Augustine's committee offers several possibilities. It does not rule out a return, but does describe something called a "Flexible Path" for exploration. This might involve sending people to the moon, but might also involve visiting asteroids and other places of interest. In other words, human exploration of the solar system does not have to be fixed doggedly on the moon first and Mars later.

Such flexibility sounds appealing. But in the case of NASA, which struggles to maintain funding for long-term projects because of short-term political juggling, it is a mixed blessing. If the committee's recommendations are implemented, the agency might still get much of what it wants, albeit more slowly than it would like. But there is a danger that without deadlines and an agreed budget, it will end up very rapidly going nowhere at all.