

Say's reading materials for Group B

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The Economist

A new age of space exploration is beginning

It will need the rule of law and a system of arms control to thrive

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The moment when, 50 years ago, Neil Armstrong planted his foot on the surface of the Moon inspired awe, pride and wonder around the world. This newspaper argued that “man, from this day on, can go wheresoever in the universe his mind wills and his ingenuity contrives...to the planets, sooner rather than later, man is now certain to go.” But no. The Moon landing was an aberration, a goal achieved not as an end in itself but as a means of signalling America’s extraordinary capabilities. That point, once made, required no remaking. Only 571 people have been into orbit; and since 1972 no one has ventured much farther into space than Des Moines is from Chicago.

The next 50 years will look very different (see Science section). Falling costs, new technologies, Chinese and Indian ambitions, and a new generation of entrepreneurs promise a bold era of space development. It will almost certainly involve tourism for the rich and better communications networks for all; in the long run it might involve mineral exploitation and even mass transportation. Space will become ever more like an extension of Earth—an arena for firms and private individuals, not just governments. But for this promise to be fulfilled the world needs to create a system of laws to govern the heavens—both in peacetime and, should it come to that, in war.

The development of space thus far has been focused on facilitating activity down below—mainly satellite communications for broadcasting and navigation. Now two things are changing. First, geopolitics is stoking a new push to send humans beyond the shallows of low-Earth orbit. China plans to land people on the Moon by 2035. President Donald Trump’s administration wants Americans to be back there by 2024. Falling costs make this showing off more affordable than before. Apollo cost hundreds of billions of dollars (in today’s money). Now tens of billions are the ticket price.

Second, the private sector has come of age. Between 1958 and 2009 almost all of the spending in space was by state agencies, mainly nasa and the Pentagon. In the past decade private investment has risen to an annual average of \$2bn a year, or 15% of the total, and it is set to increase further. SpaceX, Elon Musk’s rocket firm, made 21 successful satellite launches last year and is valued at \$33bn. Jeff Bezos, the founder of Amazon, sells off \$1bn-worth of his shares in the company each year to pay for Blue Origin, a space venture. Virgin Galactic plans to go public this year at a valuation of \$1.5bn. As well as capital and ideas, the private sector provides much greater efficiency. According to nasa, developing SpaceX’s Falcon rockets would have cost the agency \$4bn; it cost SpaceX a tenth of that.

Two new commercial models exist or are within reach: the big business of launching and maintaining swarms of communications satellites in low orbits and the niche one of tourism for the rich. The coming year will almost certainly see Virgin and Blue Origin flying passengers on sub-orbital excursions that offer the thrill of weightlessness and a view of the curved edge of Earth against the black sky of space. Virgin claims it might carry almost 1,000 wealthy adventurers a year by 2022. SpaceX is developing a reusable “Starship” larger and much more capable than its Falcons. Yusaku Maezawa, a Japanese fashion mogul, has made a down-payment for a Starship trip around the Moon; he intends to go with a crew of artists as early as 2023.

Such possibilities could see the annual revenues of the space industry double to \$800bn by 2030, according to UBS, a bank. Still further in the future, space development could remake how humanity lives. Mr Musk hopes to send settlers to Mars. Mr Bezos, the richest man in the world, wants to see millions of people making a living on space stations, perhaps before Armstrong's footprint marks its centenary.

At a time when Earth faces grim news on climate change, slow growth and fraught politics, space might seem to offer a surprising reason for optimism. But it is neither a panacea nor a bolthole. And to realise its promise, a big problem has to be resolved and a dangerous risk avoided. The big problem is developing the rule of law (see International section). The Outer Space Treaty of 1967 declares space to be "the province of all mankind" and forbids claims of sovereignty. That leaves lots of room for interpretation. America says private firms can develop space-based resources; international law is ambiguous.

Who would have the best claim to use the ice at the poles of the Moon for life support? Should Martian settlers be allowed to do what they like to the environment? Who is liable for satellite collisions? Space is already crowded—over 2,000 satellites are in orbit and NASA tracks over 500,000 individual pieces of debris hurtling at velocities of over 27,000km an hour.

Such uncertainties magnify the dangerous risk: the use of force in space. America's unparalleled ability to project force on Earth depends on its extensive array of satellites. Other nations, knowing this, have built anti-satellite weapons, as America has itself (see Briefing). And military activity in space has no well-tested protocols or rules of engagement.

America, China and India are rapidly increasing their destructive capabilities: blinding military satellites with lasers, jamming their signals to Earth or even blowing them up, causing debris to scatter across the cosmos. They are also turning their armed forces spaceward. Mr Trump plans to set up a Space Force, the first new branch of the armed forces since the air force was created in 1947. On the eve of the annual Bastille Day military parade on July 14th Emmanuel Macron, France's president, also announced the formation of a new space command.

In Heaven as it is on Earth

It is a mistake to promote space as a romanticised Wild West, an anarchic frontier where humanity can throw off its fetters and rediscover its destiny. For space to fulfil its promise governance is required. At a time when the world cannot agree on rules for the terrestrial trade of steel bars and soyabeans that may seem like a big ask. But without it the potential of all that lies beyond Earth will at best wait another 50 years to be fulfilled. At worst space could add to Earth's problems.

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