

# Space research pays for itself, but inspires fewer people

February 24 2014, by Ashley Dale

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Earthrise from moon, as seen by JAXA probe. Credit: JAXA

To say space research is a waste of money is wrong. For every US\$1 put into US space agency, its citizens get [US\\$10](#) as payback; in [Japan](#) and the European Union that amount is more than US\$3.

The growing private [space](#) industry is built around these government space programs and would not exist without them. The UK's annual US\$500m contribution to the European Space Agency (ESA) has catalysed the formation of the fastest growing industry. Its private space industry contributes [US\\$15.2 billion](#) a year to the economy. Similarly, Japan's US\$2.3 billion into the Japan Aerospace Exploration Agency

(JAXA) has enabled its private space industry to contribute [US\\$31 billion](#).

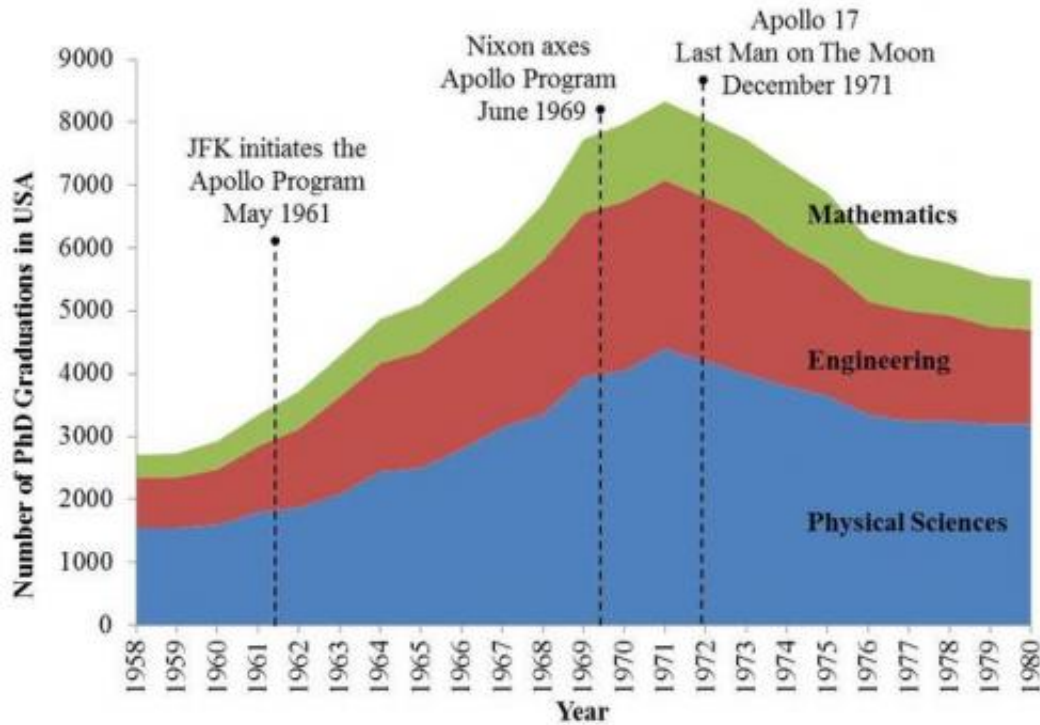
Not only do space agencies pay for themselves directly, they create jobs and are boosting the global economy by [US\\$300 billion](#) annually through private industry.

The thousands of inventions and innovations spun out from [space research](#) have become an integral part of our daily life: weather forecasting, satellite television and communications, disaster relief, traffic management, agricultural and water management, and global positioning system (GPS), are but just a few.

As space research required bigger and bigger investment, the nature of international research changed. The space race became a space collaboration, which is symbolised by the International Space Station.

If nothing else, as Pete Worden, Centre Director of NASA Ames, told me, "Space is cool". It inspires the new generation of kids.

The Apollo missions inspired a generation. The number of US graduates in the science, technology, engineering and maths (STEM subjects), from high-school through to PhD, has doubled. The relative growth rate since then has dropped drastically, even though the total number has gone up. Doubling a population's scientific literacy when it is living in a world so dependent on science and technology was a good move, and it slung the US into the dominant position it has stood in for the past five decades.



How the “Apollo Buzz” affected education in the US.

While they still inspire, some would say today's space agencies lack direction. Robert Zubrin, president of the Mars Society, [said](#), "Instead of pioneering new worlds like those explorers of the past, we have left our sailors in the harbour for half a century to see the health effects from doing so".

The average annual expenditure of NASA during the Apollo Era was US\$23 billion in today's money. NASA's average spend in the last decade was US\$17 billion. Even with similar budgets, the progress made in the last decade is simply not comparable to what was achieved in the 1960s.

Space research has opened our eyes to real risks we face as a species: global warming, asteroids impacts, vulnerable ozone layer, and even

warning about how our electronics would be affected by the sun.

## **Dreaming big**

One way to push the speed of progress would be to make life multi-planetary. Visionaries like Astronomer Royal Martin Rees believe explorers would have a human base on Mars by 2100. He claims that if we do not spread soon this will be "our final century".

Space agencies around the world are slowly converging on the grand challenge of sending a manned mission to Mars. Mars is the next [logical step](#). Zubrin said, "The Moon is to Mars, what Greenland was to North America in the previous age of exploration".

Mars has all of the resources required for a technological civilisation. With a 24.6 hour day, fertile soil, a CO<sub>2</sub> rich atmosphere, and an abundance of water, the introduction of flora is a real near-term possibility. Transformation of the atmosphere into something more hospitable may not remain science fiction.



Liu Yang, trained by the China National Space Administration, is one of ten Chinese astronauts to have travelled to space. Credit: CNSA

But it is no longer reasonable to just assume that the first human expedition to Mars will be carried out by astronauts from the US or Europe. As the late Jacob Bronowski [once put it](#), "Humanity has a right to change its colours".

Through industrialisation, the economies of China and India have been doubling in scale every decade, and are forecast to overtake the US by 2023 and 2048 respectively. Though some are [still resistant](#), the West has slowly begun to realise that if it does not take the next step for humanity, someone else will.

Some believe that a manned mission to Mars would require multi-national collaborative effort, however Jean-Jacques Dordain, director

general of ESA, [has said](#):

Coupling this ever growing obsession we in the West have with risk aversion, to the bureaucracy and difficulty of international collaboration, though I really want us to do it, such a mission would be impossible for us to achieve.

Two privately funded teams, Inspiration Mars and Mars One, are set on sending a [manned mission](#) either to or around Mars in the coming decade. But Elon Musk, who leads SpaceX, is worried that the real question is not who, but when. [He wonders](#) "for how long humanity will have the technical capability of sending people into and beyond orbit."

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