

Opinion: Canada's approach to lunar exploration needs to be strategic or we'll be left behind

April 19 2019, by Alex Ellery



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Should Canada go to the moon? What's there for Canadians? It is these questions that we should ponder when Prime Minister Justin Trudeau

recently announced that [Canada will be participating in the new space exploration vision](#).

As a professor of [space](#) robotics at a Canadian university, I should welcome this news, but I am not so sure.

The United States [Lunar Gateway](#) is an incremental progression from the [International Space Station](#) (ISS) that has dominated American (and Canadian) human spaceflight for the past few decades. Of course, the history of the ISS has been [mired in controversy](#) —it was expensive, purposeless, took decades to design, re-design and finally build. It has neither yielded any great scientific advances nor has it advanced human Mars exploration as originally proposed.

Canada in space

Canada's role on the ISS was to supply a suite of robot arms, including [Canadarm 2](#). They were paid for by the Canadian taxpayer to a single Canadian company, MacDonald Dettwiler and Associates (MDA) Ltd. In turn, we obtained seats on the ISS for our Canadian astronaut corps, including [Col. Chris Hadfield](#).

There is no doubt that Hadfield, our own star-faring troubadour, and his Canadian astronaut colleagues have done much to raise awareness of Canada's participation in the human space program.

The Lunar Gateway is an extrapolation our previous arrangements regarding the ISS. It comprises a similar space station to be built in orbit, this time around the moon instead of the Earth. Yes, Earth is so passé.

Tax dollars for Canadarm 3

Canada's participation is to be dominated by [developing a new Canadarm 3](#), to be mounted onto this orbital space station, once again paid for by you, the taxpayer. The lion's share of your money will be funnelled to that same single Canadian company, MDA. In return, we shall have seats for a new generation of Canadian astronauts on the Gateway station.

Yet, the Gateway promises to be another white elephant like its predecessor the ISS.

This brings to the fore two important questions. Firstly, is it appropriate for the [Canadian Space Agency](#) to act as a government conduit of enormous taxpayer funds to a single company? This company has not been known for generously sharing their toys with the other children on the playground. Surely, the Canadian government should be serving the wider space community? What about small and medium enterprises? What's their stake? What about universities, which are repositories of some of the best minds in Canada? Are they all to be offered only meagre crumbs from the top table? Is Canadarm 3 promised to yield great technological leaps in our country?

When the [Canadarm was developed in the 1970s](#), it was an innovative and new concept in fitting with the new U.S. space shuttle. NASA didn't realize it had a need for it until, later, it realized it did —Canadian ingenuity came to the rescue because we had found a weakness in NASA's armour and exploited it. Canada became the world leaders in this new technological capability: space robotics. Since then, we have re-vamped the shuttle Canadarm for the Space Station, and that will in turn be re-vamped for the Lunar Gateway. Yawn!

The second question is will Canadarm 3 project Canadian space interests into the future? I think not. Not a Canadian boot shall step forth onto the moon's surface because the Lunar Gateway is an orbital station. The true

value of lunar exploration will not be in orbit but on the lunar surface. Everyone —Europe, China, India, Japan and the U.S. —is interested in setting up shop there.

The race for the moon

What's so attractive about the moon? The Europeans envisage a "[Moon Village](#)" on the lunar surface comprising a mixture of government, scientific, commercial and private assets. The so-called "New Space" approach in the U.S. has [encouraged the private sector with a more aggressive and pioneering approach to space exploration](#) in seeking commercial ventures, often in partnership with the public sector.

Entrepreneurs are opening new avenues for commercial prospecting —some successful, some not so much—and crucial to this is a culture of entrepreneurship and competing ideas. It is this culture that has fostered interest in the lunar surface. There are ample commercial prospects to be had: [mining water ice](#), [supplying hydrogen and oxygen](#), [building electromagnetic launchers](#), [lunar base construction services](#), [lunar mining](#), [additive manufacturing](#) and so on, to support a growing lunar infrastructure.

Global competition

Both the U.S. and Europe have fostered an entrepreneurial atmosphere to incubate competitive ideas for the next stage of space exploration on the moon, Mars and asteroids by encouraging commercial development.

For example, one European start-up company is developing [a box into which lunar soil may be shovelled and out the other side rolls out a carpet of solar cells for harnessing sunlight](#).

What is Canada doing? [Writing policy reports](#) that no one will ever read or that impose a straitjacket for Canadian activities. Hardly conducive to the fostering of innovative and competitive ideas across Canada in opening a new frontier.

So, where does Canada fit into all this? I believe the Lunar Gateway will restrict our opportunities on the moon rather than expand them. Canada has a vast array of expertise to contribute in rover vehicles, drilling, robotic mining, mineral processing, robotic construction, sustainable chemical processing, artificial intelligence, 3-D printing and robotic manufacturing that are all essential to the development of a lunar surface infrastructure.

We already lead in relevant core technologies areas on Earth and in space which are directly applicable to this new commercial environment. If Canadian taxpayer funds are funnelled to a small MDA-led Canadarm 3 consortium, there will be little left to invest in true commercial ventures on the lunar surface.

We will be left behind in orbit around the moon, having committed our investment for the next decade or two to serving the Gateway.

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