

## Ethical challenges in space: norms and conventions for peaceful spacefaring

Nikki Coleman

Senior Chaplain Ethicist (SQNLDR), RAAF

Email: nikki.coleman@defence.gov.au

Members of the Society and the Academies, distinguished guests, it's an absolute honour to be here today to talk to some fantastically curious minds.<sup>1</sup> This is the speed-dating version of space ethics. These are my opinions and not the opinions of the particular organisations that I work for. In 2020, I will be the Senior Ethicist for the Air Force with a mandate to work in space ethics and even then my opinions will be my own as well.

What is space ethics? I had a lovely experience with a 14-year-old girl: I go and do a lot STEM things — people were talking earlier about how we do training. I'd like to say all of us in this room have a responsibility to get young people excited about science and space: I go into high schools and I talk about the ethics of what they're looking at, and get young people to talk about those sorts of things. My favourite story is of a 14-year-old girl who, when the teacher introduced me, said, "Oh you're a space ethicist, is that like a real job?" I'd just like to say when the Governor today mentioned space ethics, I was sitting up the back going, "It's a real job."

What is space ethics? Obviously space ethics is looking at the ethical implications of what we do in space and also within the space industry potentially on Earth and potentially about the future plans that we

have. Realistically it is ensuring that what we do in space is not just legal but is also ethical. It'd be great if it could be both. It's also important that we look at what is ethical, not just for now, but for future generations. When we were talking about going to Mars earlier, I was really excited because there's actually a conference in Adelaide in a couple of weeks' time looking at radiological protection and going to Mars. They've got me coming in to talk about the ethical implications around some of those things. For example, around genetic changes that might happen to people in space. So it's about our future generations as well.

A second example, which has been discussed today, is space debris. I'm sure you are all concerned about climate change and the problems that are associated with that on Earth. It's an awful situation that we actually need to work on now. That keeps many people in the world up at night. You should also be awake worrying about space debris, let me tell you. Much of our lives revolve around the use of satellites, particularly in low-Earth orbit. One of the concerns around space debris is that we will get to something called the Kessler syndrome which is a cascade effect of many different accidents (or potentially formed on purpose) and there is a concern that it might actually make an entire area of Earth not able to be used. The idea of Elon Musk putting 40,000 CubeSats up keeps me awake at night.

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<sup>1</sup> This is an edited version of the transcript of Dr Coleman's talk.

One of the other areas that we've talked about today is Earth observation. It was great to hear of Planet [?]: they do some really interesting work. They actually map the work, take photos of the Earth every 24 hours and they make those images available to humanitarian groups, for example, who can track when refugees are being moved or when there's problems with particular crops, for example. They do a wonderful job. But they are in the process of making money and I once asked them some really awkward questions such as, "Will you sell your data to anyone?" And they were, like, "Well, we've got to make money, of course we'll sell it to anyone". I'm, like, "Okay, let me put the ethicist hat on for a moment. Would you sell it to a rogue nation who wants to invade Australia?" and they were, like, "Oh, well, you know, we'd have to think about that." Okay. "Would you sell it to the drug cartels who want to try and work out from looking at mapping data about how their competition is actually moving drugs around in another area?" One of the concerns that I have is that we talk about space being available for all, and that's actually a really noble aim, but there are some groups that we actually don't want to have easy access to space and potentially use space in a nefarious way against us and potentially against future generation as well.

Which leads me to my next point. A lot of my research is on space terrorism, and, let me tell you, I would not recommend this as an area of research to go into because every time I fly to America, I am randomly selected when I go through the security line. I would not recommend it. But, I and my team have looked at — spent far too much time looking at — how nefarious groups whether they be non-state groups such as

ISIS or rogue nations, who could actually use space against us. We rely on space for so much of our lives: for communication, for navigation, for financial markets, for food distribution systems. If those things went, if we lost low-Earth orbit and we lost the use of those satellites, then our lives would go back to the 1950s, and a lot of you might remember that better than me, but it actually would have a huge impact on a very large number of vulnerable people in society. And it raises other bigger issues, ethical questions regarding space. For example, it's been wonderful that we've actually talked about the indigenous use of space, but there's not a lot of discussion being had, apart from Alice Gorman, about the impact on indigenous communities on the use of space all around the world. Because often these space launch facilities are put in locations that actually kick indigenous people off their land, who take away their livelihood — there's been a long history of this.

It's really great, however, to see two very positive, ethical space stories. The two that I'd just like to highlight with you are Rocket Labs in New Zealand and Equatorial Launch in Australia. Both of those groups have actually looked very carefully at the impact that they could potentially have on indigenous people. And it's just not a tick-a-box, "Oh yes, we've talked to the local people", they are actually working on meaningful, long-term partnerships so that each group is learning from each other.

There are many wonderful uses of space, some of which we've heard about today. For example, going back to the Moon and going onto Mars. Or constellations of small CubeSats that could actually bring the internet to large groups of people, for example, in India and Africa, similar to the Google

Zoom Project. There are many wonderful ways in which space can be used, but I think all of us have a responsibility — to the present, to future generations and also to our planet — to actually ask the ethical questions about how this could potentially be used in a more nefarious way or have unintended consequences. Because sometimes those unintended consequences, such as the Americans giving blankets to the indigenous people, can wipe out an entire group of people. And we have to think carefully about how we utilise the resources that we've got.

Thankfully we have some really great people working on this. You'll be pleased to know that Australia is one of the leaders in space ethics, and in the area of military space ethics we are actually the world leaders, which is really encouraging.

Lastly, one of the things that concerns me — and I have to be guilty and say I've used the "wild west" phrase before and I need to make sure I don't say it anymore — is that

space is becoming increasingly congested, contested and competitive. Right now we need strong laws and we need a strong body to be able to enforce laws that relate to space operations in low-Earth orbit, all the way up to asteroid mining. There are huge ramifications if we get this wrong. Just recently an Israeli company put something on the Moon, accidentally crashed it into the Moon, but it actually contained organisms, organisms in amber, organisms called water bears (or tardigrades), which can actually survive in these sorts of environments. The Israelis hadn't told anybody that this was on their payload. They added it as a secondary payload to another launch. So my concern is that we have laws, but we need to ensure they're actually enforced. Not just so that we can have red tape and bureaucracy and give bureaucrats jobs, but so that we actually make the environment here on Earth and in space safer for now and also for future generations.

