

## Commercialisation of Space

Thanks to AIAA Sydney Section I travelled to Adelaide for IAC 2017, my first Space conference, and given the experience I had, I'm sure it won't be long until I attend another. The week was jampacked with Plenaries, technical talks, and various other events that seemed more engaging and inspiring than the one before. With so many interesting topics discussed, one of the trends which caught my attention the most is the growing commercialisation of space. Unsurprisingly it's something which has been progressively gaining interest in recent years, with people all round the world seeing the opportunity of utilising new technology to create and dominate their own market.

Some of the main areas which focused on commercialisation were: Satellite constellations, small satellite focused rockets, space mining, space debris, and space tourism.

Satellite constellations are obviously a very popular and talked about up and coming technology with well-known companies such as Space-X and OneWeb working to provide global internet coverage.

There was some presence at IAC from companies working towards constellations, such as Australian based Fleet Space and Sky and Space Global (SAS). SAS were perhaps the biggest surprise of IAC for me as they were a company which I previously knew nothing about. As such it was extremely interesting to hear about their mission and the progress they have already made. Unlike many other NewSpace start-ups SAS have already launched satellites. They have three test satellites in orbit



which have been used to send messages, images, and even the first phone call facilitated by a nano-satellite. SAS are also different from most other space start-ups as they are a publicly listed company. They took a different approach to most other companies by listing on the Australian Securities Exchange very early in the life of their company. The success they have had so far is thus a testament to the growing commercial interest and potential in space.

To support this growing interest in the various uses of small satellites in low earth orbit, there are a number of companies aiming to be launch providers dedicated to delivering small satellites into orbit. Three of these present at IAC were: Rocket Labs, Virgin Orbital, and Gilmour Space. While it was fantastic to talk to the Gilmour brothers about their experiences being an Australian based rocket company, it is Rocket Labs who have stolen the show in terms of dedicated small satellite launches. They have received a lot of publicity and were a large factor in the creation of the New Zealand Space Agency. A strong indication of how much support and interest there is in the capabilities of small satellites.

Space mining and space debris are two areas which are still very much in their infancy, yet are already receiving a lot of attention. Space debris has been a growing concern which is only going to get worse unless something is done to manage it. However, clearing this debris seems more like civic duty than a profitable business model, which is why it was very interesting talking to some representatives from the Space Environment Research Centre (SERC) who suggest otherwise. Due to the strict and finite fuel budgets for satellites, manoeuvring to avoid debris can be costly to the life of the satellite. SERC are currently working on a high intensity laser system which would allow direct

targeting of space debris, so that rather than manoeuvring a satellite, a company with this laser system could be paid to shift or de-orbit the debris. This is obviously a very appealing business model, as it allows satellites to avoid collisions and conserve fuel, while at the same time funding the removal of space debris.

Space mining is a similar situation in that it represents a both beneficial and profitable opportunity, yet the technology is still being developed. While I was unable to speak to any specific companies or people focused on space mining, a law recently passed in Luxembourg was mentioned a lot. This law is the first to establish legal certainty that space mining companies will be able to keep material from asteroid mining. The benefit of this has already been seen, as it is encouraging investors to invest in space mining companies as they are now able to see the possibility of a return on their money, and space mining as a potentially profitable business. While it may be a long way away before we actually see commercial space mining, it is still fantastic to see countries facilitating the growth and success of space companies.

Receiving a lot of media attention is the current development of space tourism. Progressing from simulated zero gravity aeroplane flights, to planned commercially available flights which will experience real microgravity. Blue Origin, Virgin Galactic, and Boeing all spoke about their plans for space tourism and how they are working to make space accessible to anyone, provided they have enough money. Which obviously is the driving factor for this work. Given it will allow anyone to go into space and experience micro gravity, a dream which I'm sure a huge number of people have, it is unlikely that any company which can successfully offer this with a reasonable price will be struggling to find customers. It was fantastic to have representatives from all three companies speaking at one Plenary about the differing flights they're going to offer. Blue Origin and Virgin Galactic are both working on providing short sub orbital space flights. Boeing on the other hand is taking a drastically different approach, planning to offer one civilian seat on their manned missions to the International Space Station. While it may still be some years away, it's interesting to see how these big companies are looking for ways to access more customers so that they can generate the revenue needed to support their larger projects and developments.



It was fantastic to hear about the success that space companies have had, as well as the potential that many still see. An example of the faith that many have in this, is the growing investment in space companies, this is fantastic to see as investors are not charities and will only invest if they can see a return on their investment. However, something I heard which stuck with me was: "You can sell to an investor, but an investor is not a customer." It is important to remember that investment is not the goal of a company, and for the commercialisation of space to really progress, it needs to be consumer based. That's why it was so fantastic to hear from companies at IAC who are making products and services to support a consumer and now have their own customer bases. Out of all the things I took from IAC, perhaps the key thing is how optimistic the future of space looks, and I can't wait to see what the next few years bring. I am incredibly grateful to AIAA Sydney Section for giving me the opportunity to attend this amazing conference.