

David Glanz: It's been a long time coming, but Australia finally has a space agency. With the release of the movie, First Man about the Apollo 11 mission to the moon, a lot of us have our heads tilted to the stars, but what does the space agency do?

David Glanz: Can we expect an Aussie astronaut to leave Blundstone bootprints on the moon anytime soon? The reality is a little more down to earth an Australian space industry is more likely to be about helping our farmers than chasing little green men.

David Glanz: I'm David Glanz and my guest today, Dr. Megan Clark, AC, is our very own first woman, the founding head of the Australian Space Agency. She's a fellow of the Australian Academy of Technology and Engineering and she's here to explain what the Australian Space Agency is all about.

David Glanz: Megan, congratulations on your historic appointment. What's the space agency's mission?

Megan Clark: Well, our purpose is going to be pretty clear, and focused on transforming and growing the Australian Space Industry, but also the use of space across the broader economy. Just as you mentioned, our agriculture industry, our mining industry, our banking industry, so impacting everyday lives and there's enormous value for the country in that. So a very commercially-focused agency. We're the most industry focused agency in the world.

David Glanz: So they focusing more on satellites than on space missions?

Megan Clark: We're not limiting our vision at all. We want to see Australian technology on joint missions. We want Australian's to be able to look up and be proud of seeing Australian innovation, Australian creativity, Australian technology in space. So we're not big enough to be able to run multibillion dollar missions ourselves, but there's nothing stopping us being a partner with other countries on missions. And we're not limiting ourselves [inaudible 00:02:01] just to satellite technology at all.

Megan Clark: We're already having discussions with the major space agencies of the world for Australian technology to be part of interplanetary missions. We're already talking to NASA about the Lunar Gateway, so we're not limiting our vision at all here. We just want Australia to take part in this fast growing industry.

David Glanz: And does Australia have a particular strength? Is there some element of the space industry that we can offer, which is better or stronger than other people around the world?

Megan Clark: Certainly Australia has to make choices given that we have a limited amount of funding to be able to participate, but we've got some fantastic strengths and areas where we can be competitive. So the agency has identified six National Civil Space Priorities.

Megan Clark: The first one is communication. We have the fantastic geographic location that we look into the solar system, we look into our galaxy unlike the northern hemisphere, and we cover a major part of the Earth's rotation as well for communication. So communication is vital for us, it's three quarters of our Australian Space Industry market today, and we know that space is going to be a really important domain in future communication. But right now most communication is done in the radio spectrum from space to earth and our connections to our satellites.

Megan Clark: But in the future we're seeing the ... like everything else, everyone in space wants more bandwidth, so no different to our kids, our families, etc. Everyone wants more bandwidth and the next jump in communication will be using light. So you can use a laser to be able to communicate. So a laser having both the properties of waves as well as being able to put sort of discrete packets of information using light, and this gives you a big jump. So already in space satellite to satellite, they're using lasers to be able to communicate data and the next jump is bringing that down to earth. So communication our first priority, a very important one for us.

Megan Clark: Second one, Space Situational Awareness, which is space debris. So Australia can really step up and be a responsible global citizen in an area where we need to work together around the globe for tracking and monitoring debris. Everything from literally a speck of paint that's traveling around to larger objects 10 centimeters and above. And I think it starts to crystallize in your head when you think that even a speck of paint in space is traveling at 28,000 kilometers an hour. So when that hits your windscreen and you're in a space shuttle, and you get a little star on your windscreen, that is seriously scary. So we need to track that, that's our second area.

Megan Clark: Our third area is what we call Position Navigation and Timing. And the government has funded Geoscience Australia to do two things. One, catch us up with the rest of the world. We were behind the world in how accurate our GPS was. So they have 161 million to bring us 10 centimeters, so 10 centimeters is about half the span of your hand, 10 centimeter accuracy across all of our land, all of our maritime jurisdiction and all of our airspace. Accuracy is very important for aircraft. But they took another step and I think this is really tremendous, it's been very well received to go to three centimeter accuracy where you have a mobile phone network.

Megan Clark: So you can use the mobile phone network to add an additional correction to get very accurate. Well three centimeters, you can kind of hold your two fingers between that. That allows you to have automated vehicles, automated transport, trains, etc. And 99% of our population live in our cities, so that's a big step for us.

Megan Clark: The other areas that we've highlighted, Earth observation, we want the platforms that have been developed in Australia to go global. We've got

Leapfrog Technology areas, very important for the ATSE community and we've got some tremendous [inaudible 00:06:32] areas, quantum computing, quantum storage, new propulsion technology, 3D printed fuel, harbored rockets. We've got some extraordinary areas but they're not yet fully on the global stage. And we want to be able to nurture those all the way through.

Megan Clark: And our last area of priority is what we call Earth-to-Space and Space-to-Earth. Australia leads the world in remote asset management. We manage parts of northern Australia from thousands of kilometers wide, complex areas bigger than ... Pilbara's bigger than England in ... and people forget that. And we manage it from 1500 kilometers away. We've got complex things like our offshore oil rigs, really dense engineering in a very small space. And you think about that and you go, "That's not much different to the International Space Station." So this analogy between what we do in Australia and remote asset management in some extreme environments, and what we do in space, it's just a natural partnership. And we see that as one of our areas for priority and as you asked where we have a natural competitive advantage.

David Glanz: You mentioned that the agency is probably the most industry focused of space agencies around the world. I noticed one of your early achievements is an agreement that you've signed with Airbus Defense and Space SAS. So as an example, what would be involved in that?

Megan Clark: We're really thrilled about the opportunity to start doing what we'd call Statements of Strategic Intent with Industry. So this is the new world of moving from government funding to now dominated by commercial and industry funding in space. And to really match that trend, we looked at the opportunity of saying, "Well how do we work directly with industry to encourage industry to invest in not the competitive area where they participate, but in sort of pre-competitive research? What are they doing to help build the industry here in Australia?"

Megan Clark: So the Airbus agreement had two really major commitments from Airbus. First was that they chose Australia to be the launch and retrieval site for their High Altitude Pseudo-Satellite, which they call the Zephyr.

Megan Clark: So the Zephyr's sort of like a big paper plan, imagine a big paper plane that stretches across a couple of lanes of highway basically. And you've kind of got that image, lovely wings, solar-powered, able to take about three kilograms of payload, so communication or Earth observation payload. And you launch it with five or six people standing on the corners and you literally run it down the runway. They run it down the runway and it takes off like a paper plane, but then it climbs up to 20 kilometers. So that sits below where Low Earth Orbit Satellites sit, but it sits above commercial aircraft and it's above weather etc. So it sits up in a sort of sub-orbital area, and this is a completely new platform.

- David Glanz: So Airbus has chosen Australia to be the first global launch test site. And that will be in, Wyndham in Western Australia, up in northern West Australia. And that's a partnership with the United Kingdom Space Agency and the United Kingdom Department of Defense. So that was one really important choice.
- David Glanz: The second was that they have something called Skynet, which is a constellation of communication satellites, and they moved one of them. So they moved one of their Skynet satellites to be over the Asia-Pacific region, very important region for the communication market. And they chose Adelaide to be the control and communication, and advanced communication link to this new satellite.
- David Glanz: So two great choices and Airbus has also committed to exchange of personnel, so that's training for our young people. And to support research and development in this country. So these are the sort of encouragements that we want from industry and we want to attract it into Australia.
- David Glanz: Well you've set a cracking pace. The agency's only existed for three months officially, although I'm sure you did a bit of groundwork before the launch day. But we're actually recording this podcast on the very last day of World Space Week. So how have you gone about celebrating World Space Week?
- Megan Clark: Oh, celebrating, boy we're working pretty hard. So look, just having the agency has completely captured the imagination and momentum across the country. And we've seen that and felt that and so it's just fantastic that we've now got an agency.
- Megan Clark: What we've seen is a couple of things. First of all, in our first 12 weeks, the Australian public has responded in a way that we could not have imagined. Over 20 million Australians have seen, read or heard about the agency. And the letters we get from kids who go, "I didn't think I'd ever be able to be in this industry. Now that we've got a space agency, I think it's possible," so just igniting their ambitions has been great.
- Megan Clark: The second area we've seen is that we were missing out internationally. We didn't have that one door, one voice. And I can remember writing about this, but now that we're in it, now that we're out there opening the doors, and we're seeing the warmth and the engagement with other countries. We've signed agreements with the United Kingdom, with Canada, we're finalizing our negotiations with the European Space Agency, we're talking to NASA on a number of fronts, and we've [inaudible 00:12:26] signed an agreement with the French agency. You can see that they were simply waiting for us and wanted to engage. So I've been overwhelmed with how important having that international door is for our researchers to walk through and for our industry players to walkthrough, and to open up opportunities from which we have been [inaudible 00:12:50] in the past and haven't been able to move through. So wonderful response that's taken us all a bit by surprise.

David Glanz: And I mentioned at the beginning, it's been a long time coming. I looked back through the history of the academy and I noticed that in 1984 the then minister for science asked the academy to come up with a space policy for Australia, which I think, the academy duly delivered in 1985, and then nothing happened. So it's really good to see a fellow of the academy finally helping make all this happen.

David Glanz: Finally, you mentioned the kids who are writing into you. For school students or university students who might be listening to this, or to their parents who are going to tip them off to what we're talking about, what is the vision? If you're a twelve-year-old or a twenty-two-year-old today, how can you be involved in the space industry? How big can your dreams be?

Megan Clark: I think nothing inspires quite like space. We've seen the way that nations respond to that, and the reason for that is that it really is a pathway for human ambition to consider interplanetary exploration, to think of habitation of our species off our planet. And of course our constant search for new life off our planet. And you can really dream that big because of the space technologies that have transformed the way we live here on earth.

Megan Clark: I mean, Wi-Fi came from the thinking of John O'Sullivan and his team on how you listen to the faintest whispers in the radio spectrum coming from the most distant galaxies. And they were thinking about it in a way that was completely different to everyone else. So everyone else around the world was going, "Gee, if I'm trying to resolve a Wi-Fi signal to the right phone, then maybe it's the first signal," so they were using time. Our first signal that gets to the phone will be the stronger signal. But of course John O'Sullivan and his team said, "Well that makes no sense when you're listening to a very distant galaxy," and they used a completely different approach.

Megan Clark: They used a Fourier Transform project, a mathematical approach to segment out these different signals. And now we take it for granted that my phone and your phone can figure out our Wi-Fi signal. So, space has transformed what we do [inaudible 00:15:13] ... then we forget every time we use that little blue dot on our phone, and it tells us where we are and gets us to the right place. We forget that, that signal's going backwards and forwards to space. That's connecting with the 6 GPS satellites that Australia accesses.

Megan Clark: Everyday we use space and it will be a defining demand. So all I say to kids out there is, "Everyone at the space agency is very curious to learn more and I think that's where it starts. Just be curious about space and there are so many different areas where you can explore a career in space." We need space lawyers. We're already working even with the arts community in terms of the design and the connection with people. We need engineers, we need data specialists, we need doctors who can help tourists going to space. So it's not limited as it may have been in the past as to a very narrow area. We're not limiting our vision. So let's hope that the kids out there don't limit their vision

and they can figure out how to use some of these extraordinary technologies that are coming from space.

David Glanz: Well thank you so much for coming in. I know you're frantically busy and it's really good of you to make some time to talk to us today.

Megan Clark: No, it's my pleasure, and just a real thank you. As you mentioned that the academy many years ago really was part of those steps along the way. And we've seen over really decades a lot of people involved in getting a state space agency. And just a real personal thank you to everyone out there who has helped take those steps, all those steps along the way that have led to Australia finally having [inaudible 00:16:56].