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Address to the Space Industry Association of Australia (SIAA) Southern Space 2024

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Thank you for that warm welcome and thank you to SIAA for the opportunity to address you today.

No one in this room needs to be convinced that space is important across our economy. No one here needs to be told that space will be a key scientific and economic driver in the twenty-first century, or that the processes by which we develop our technological presence in space is changing, has changed, and will continue to change the way in which societies develop and engage with each other. No one in this room needs to be told that Australia has a part to play in that story of change.

That means that we can get right to the questions that will define this sector: How will that change happen? And how can Australia be a leader in that change?

I want to give you an answer, InSpace's answer. Because I believe the next twenty years can be a story of Australian resilience, sustainability, equity, and agility. It's an answer based on what ANU InSpace has already achieved over the past five years.

InSpace – the Australian National University Institute for Space, but we're all friends here – is not a simple scientific institute. Its mission is to harness the research potential of the broader university. Interdisciplinary collaboration matters. We cannot succeed in space with narrow approaches or thinking. Our mission specialists are drawn from traditional STEM faculties such as the College of Science, but also from the College of Business and Economics and the College of Arts and Social Sciences.

That collaborative approach also extends beyond ANU. We are working with two other universities and over twenty industry organizations to found iLAUNCH – the Innovative Launch, Automation, Novel Materials, Communications, and Hypersonics program – that will help build up Australia's sovereign space capability and accelerate development of our manufacturing sector.

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That's just one of our successes. Our colleague Associate Professor Francis Bennet is developing and demonstrating CIS-Lunar optical communications that will be capable of supporting the Artemis mission. And we've delivered or partnered on over thirty initiatives through the NSQN program, helping many other teams to test and mature their advanced space products.

That's the past five years. That's the foundation. Now we need to talk about future opportunities – for InSpace, for Australian Space, and for every company, team, and ministry represented in this room.

There are five challenges that I want to discuss today, five challenges that should shape our thinking in the years ahead. They are also challenges that we can meet, challenges where we have the chance to not just rise to the occasion but to build a world-leading response. We can be leaders, and we should be. And if we tackle these five challenges head on, **we will be**.

The first challenge: Connectivity and orbital communications

Over the past thirty years, the digital revolution has created a highly mobile and interconnected world. That process has not finished. We are about to see a new wave of space-based digital infrastructure that will act as the foundations for the twenty first century's global economy.

Ask yourselves, what will the global internet look like in twenty years? Hungrier. In 2021, the UN estimated that 2.9 billion people had never used the internet. That's thirty seven percent of the global population. Last year, it was 2.6 billion. Three hundred million people came online in three years. It's estimated that the total global energy consumption from data centres could reach more than 1000 TWh by 2026, roughly equivalent to the electricity consumption of Japan, according to the International Energy Agency.

Not only are we in the throes of a second digital revolution, **but we are also not done with the first**. This is an enormous challenge to achieving Net Zero emissions targets; the demand for power and data is increasing faster than we can make efficiencies.

Chasing efficiencies alone is a mistake. Instead of trying to solve the problem, we need to change the environment that makes it a problem. Let us move the power-hungry data centres off world.

Orbital data centres powered by optical photonics are the key to a net zero internet. They will receive constant solar power, the vacuum of space will be the perfect coolant, and they will not be reliant upon easily damaged cables or be susceptible to natural disasters. The idea's not new, but the moment is upon us. Australia can seize that moment!

We are well placed to meet the demands of this new infrastructure. You know our geographical advantages of clear skies and open spaces. The technologies that this space infrastructure will depend upon are technologies that we do well: the ANU Quantum Optical Ground Station demonstrates our command of adaptive optics and quantum encryption. I've already mentioned Francis Bennet's work developing CIS-Lunar optical communications for the Artemis mission.

We must believe in our strength here – we are not competing with established players because in this field there are no established players. In fact, we cannot afford not to take part – because to do so is to give up sovereign control over what will be the most important communications infrastructure of the century.

The Australian space sector can help establish this vital global infrastructure and reap the scientific, environmental, and economic rewards.

The second challenge: Building a return and relaunch-based space economy

The other barrier to orbital data centres, of course, is the cost of lifting things into orbit. The past two decades have seen steady achievements in making launches more affordable, and both governments and corporations have expanded their investment in launch capacity to take advantage of that evolution.

The beauty of focussing on returns and relaunch is that we don't need to play catch up with seventy years of foreign investment into launches. But looking towards returns and relaunch means that that foreign technology will be coming to us to be refitted and retasked quickly, accelerating the practicality of access to space, for them and for us.

A returns- and relaunch-based service economy means many more affordable investments into the sector that create a domestic ecosystem around this critical infrastructure. But it is also an approach that will pay dividends. It will drive the development of advanced manufacturing in this country and position us to expand our links with foreign space sectors. This will strengthen our human capital and bring more money into our sector. And from there comes the growth and the resources that will let us expand into other avenues.

A returns- and relaunch-based space economy plays to our existing strengths and represents an achievable approach to space in the twenty-first century. It would foster collaboration and partnerships, and a commitment to sustainability and resilience in everything from our materials technology to our business practices. It can be pitched to investors and sold to voters.

And from there, we build.

The third challenge: Space Sustainability

The LEO shell is already in serious trouble; there are over nine thousand metric tons of debris in orbit, and that rises every year. There are already technical solutions, but implementation is lagging. We are in a struggle to protect the LEO environment for all of us, and right now we are losing.

Australia can help change that. It starts with a new approach to design, where we focus on building resilience in every aspect of our space technology. New objects in LEO must be built to have as long a life span as possible, and we must work to extend the life of objects that are already there.

Every time we launch, we damage the space environment. And our species will launch – must launch – new and vital infrastructure to help us adapt to the changing global environment. We must maximise the gains of any launch; we must minimise its impact. That will mean bringing industry and governments together to co-design components and create common standards so that solutions are easy to adopt across the sector.

Australia is once again well placed here. We have good infrastructure around testing components, the National Space Qualification Network (NSQN), only rivalled by Europe. We make it easy for space and non-space companies to get that maturation qualification, and I look towards a future where international space companies know that Australian standards represent the best in the field. Australian firms are already paving a way for sustainable space; HEO Robotics, for example, are trailblazing situational awareness from existing infrastructure, and our sector already has the expertise in robotics and situational awareness that we need to help clean up low earth orbit.

We cannot change everything, but we can give it a go. Sustainable space isn't just a worthy goal in itself, it's a way of playing to our strengths and bringing international attention and investment to our sector. We can sign up to the Zero Debris Charter as drivers of the change. It will help our sector – and it will help our world.

The fourth challenge: Space for a resilient Australia

Now I want to turn to a more troubling issue, where the question is not what we gain from space but what we lose if we are not there.

Climate change is here, and it is accelerating. Earlier, I talked about space as the road to Net Zero; now I want to talk about space as the shield from the consequences we are already facing. Because if we cannot convince our government and public to robustly commit to space infrastructure, we will not be able to handle the crisis that is already upon us.

For decades, Australia cooperated with Northern Hemisphere countries to fight fires. Wildfires came to California in our winter, so we sent our personnel across the Pacific to help; and in our summer, the Americans came here. Our strategy was built upon the knowledge that fire seasons did not coincide in different hemispheres.

That knowledge is now wrong. Painfully wrong. The overlap has begun, and it will get worse. That doesn't just mean a strain on personnel, it means a strain on weather bureaus, on meteorological equipment, on satellites that monitor fires, on data capacity.

The Australian public would never accept a situation where we did not have our own air ambulances, or our own weather stations, or any other vital equipment for dealing with natural disasters. But that is the situation we face right now, where we do not have the space infrastructure to monitor and respond to climate change emergencies.

We rely, for example, on Japan's Himawari satellites to monitor fires – and we have already faced the moment where Japan regretfully took those satellites away from observing Australia so that they could deal with their own natural disasters. That should have prompted Australia to realise its deficiency in this area. It didn't.

As a sector we must drive home, again and again, that climate change can only be understood and its consequences faced if Australia invests in our vital space infrastructure.

Where is our groundwater, and how is it being used? We can answer that in space.

What is happening in our remote regions, and how is their environment changing? We can answer that in space.

Where will the next fire come? Where will the floodwaters go? If our communities are cut off by disaster, how can we reach them?

We answer all of those questions, we will meet all of those challenges, in space.

The fifth challenge: Data Equity, and who we build space for

Now I want us to think about who our space sector is for. A stronger Australian space sector is good for our economy, our science, our environment, and our security; but national interests and the interests of people in our nation are not always the same thing.

Data is not neutral. It is collected by people, and it will reflect their biases. Consider spacesuits, an apparently solved problem. We had the data in the 1960s, we built a solution in the 1960s, and it's lasted.

And yet in 2019, NASA planned the first all-female spacewalk. It would be a historic moment, and good press, and it didn't happen. There weren't enough spacesuits that fit women. The solution that NASA had had since the 1960s was not a solution; old ways of doing things didn't meet the needs of the program or its people.

Ask yourselves, Who decides what data we will use to make our decisions? How is it collected? Or stored? And even if the data is diverse. What about the decision makers? Who has access to the information?

This is not an exercise in box ticking. If we use space to solve real world issues, we must embrace the complexity and diversity of the real world. Take remote medicine for example. Doctors who are examining patients in isolated areas will use space technology as the lens to view those patients; that lens must be free of inadvertent bias.

InSpace has worked with the ANU College of Asia and the Pacific to work on how space technology will affect Australia's neighbours; we've worked with the College of Health and Medicine to ensure that precision medicine technologies reflect the ethical and legal needs of the profession. And we've faced difficult questions about whether a one-size-fits-all approach to data management is really appropriate in a diverse nation like Australia, particularly when it comes to our First Nations.

We are a vast nation, and space technology will have a disproportionate impact – for good and ill – on our regions, as it connects them to the wider world. The decisions we make about how we deploy space technology will be felt there and felt keenly.

Global tech firms are already grappling with the realisation that algorithms that were thought to be neutral produce wildly skewed outcomes if they are not trained to deal with diverse groups of people. That is beginning to have regulatory consequences, particularly in the EU.

Australian space can get ahead of that challenge, avoiding legal headaches in the years to come, and better serving our communities right now.

Those are the five issues on which I hope Australia can be a leader in space. Some of you will already agree with me, some of you perhaps may have changed your minds, and I hope some of you will have your own themes. That's a good thing! Conferences like these are where we should challenge each other and come away with new ideas and new determination.

Where to for Australian space? If we are to realise this vision, then we must get buy-in from the top of our sector.

We need to get the leaders of our industry together, the leaders in this room. We need Academia. We need Government. Above all, we need Government. We must build a National Space Policy, a guiding document that sets out what we are working towards.

There are regulations that should be changed or adapted or introduced. There must be investment.

But all of that must follow a vision. I have set one out today, and it is one I believe in, a vision of an Australian space sector that is resilient, sustainable, a world leader in space technology, and a world leader in the ethical use of that technology. An Australian space sector that builds an advanced manufacturing base, an Australian space sector that serves the needs of modern Australia in all its diversity and complexity.

InSpace has built great things over the past five years because we knew what our plan was; and now we look to the future.

So must Australian space. We can be leaders; we must be leaders. And if we work towards a shared vision, embraced by our government, and signed up to by the organisations in this room, we will be leaders.

The Australia of the twenty-first century demands it.

Thank you,

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