Inquiry into job creation opportunities in Queensland arising from the establishment of an Australian Space Industry

Information Paper No. 2: What does the space industry require?  February 2019

The demands of the space industry

Information Paper No. 1 demonstrated that the modern space industry is here now and growing at a significant pace. There is the opportunity under a cohesive national space strategy to double Australia’s share of the global space economy within five years and to capture 4% of the world market within 20 years.¹

However, to ensure Australia and Queensland captures our share of this nascent industry, we need to know what the industry needs, and how we can meet those needs. Queensland needs to develop and leverage the existing capabilities of different Queensland industries and demonstrate how new and existing businesses from all over Queensland can insert themselves into a complex supply chain.

The space industry supply chain has been described as beginning with the development and launch of spacecraft and ending with the application of the data delivered by spacecraft.²

The CSIRO further identified the elements of the space economy supply chain to comprise both upstream (ground systems, launch and operating objects in space) and downstream (utilising space data and technologies across a range of applications) activities.

Space systems

The capacity to produce durable space systems is a critical need for a local-based space industry.

Space systems can broadly be defined as design and/or manufacture of space equipment, operating components and systems based in space. Space systems also include launch activities and services related to the launch of space systems.

The 2018 establishment of the Australian Space Agency has reignited interest in developing a national space industry and the debate in regard to Australia’s capability to offer launch services. Australia has been a significant user of launch services, but has no orbital or sub-orbital launch capability of its own.³ Without access to convenient commercial launch facilities, Australia’s space industry needs to look offshore for launch capability⁴ and this limits the development of a domestic space industry.

Launch site

A space launch facility is viewed as an essential component of the space industry chain, linking industries in the upstream sectors such as manufacturing and technology industries, with the growing downstream industries such as satellite operators and data users.⁵ There is a significant emerging market around nanosatellites and therefore a strong business case to develop launch facilities for this segment.⁶

Space industry supply chain⁷
What launch sites need:

- Open spaces in the west and a long eastern coast allows for a ‘general purpose’ site, similar to the Kennedy Space Centre, which provides flexibility for both polar and equatorial launches.  
- Capacity to provide for easterly launches offers commercial benefits due to a ‘slingshot effect’, that is, as the earth spins in an easterly direction the rocket will pick up ‘about 460 metres a second’, boosting the rocket’s performance.  
- Defence controlled and low-use airspace, which makes launching easier to manage.  
- Geographic position close to Asian markets for the import and export of space-related products.

Launch vehicles

The 2018 Review of Australia’s Space Industry Capability identified a significant growth in the nanosatellite sector over the next 20 years. Currently, Australia does not have the capacity to meet the demand for launch vehicles for small payloads. This is an area of critical need in the industry.

There is a bottleneck in the market. We look at how many companies are out there that intend to launch satellites that have good levels of funding... Just that number is 5,000 or 6,000 satellites and they are in the 200- to 400-kilogram range... they have an average life span of five to seven years. If you think about it, on average, there is going to be a thousand of these satellites that have to go up each year and they have to go up on an independent launch vehicle because they are all in independent orbits. The frequency of the launch is going to become massive and the market is not ready for that.

This investment has produced benefits for both the space industry in that country and for Rocket Lab.

NASA, in partnership with Rocket Lab, recently sent Cube-Sats to space. This was NASA’s first dedicated launch of low cost launch services, which provide an alternative to the ‘rideshare’ approach.

Ground systems

Ground systems are often an overlooked segment of the space industry, but are as crucial as space systems in the supply chain. Ground systems include ground segment operation of satellites and spacecraft. Ground systems communicate with spacecraft and satellites to both send and receive data.

In comparison to Australia’s Asia neighbours there is limited ground station infrastructure in Australia. Consequentially, Australia is reliant on international partners to downlink satellite data.

Limited ground station infrastructure and access to bandwidth significantly constrains the downlink of data, consequently producing a ‘downlink bottleneck’.

... images are downlinked through Alaska, Toulouse in France or various other sites, and it can take 24 to 36 hours for those images to come back to Australia once they are downlinked, processed and then pushed back through the internet. If we were to have some ground facilities and data processing here in Queensland, potentially you could be processing and providing those images within minutes rather than days.

Additional ground stations within Australia could deliver faster response rates in the provision of satellite data and address the downlink bottleneck.

Australia’s geographic location makes it a strategically important location for downlinking of large amounts of Earth observation satellite data. When combining Australia’s land surface, marine areas and our Antarctic territory, we have oversight of almost 1/8th of the Earth’s surface.

What ground stations need:

- A range of geographic and infrastructural strengths, such as clear skies, low radio noise, access to bandwidth and computing capacity.  
- A large land mass and position which allows for the capture of a wide range of data from space.  
- Proximity to end users involved in sectors, such as environment, mining and agriculture who use earth observation data on a daily basis to support business decisions.
• With connectivity required for Space 2.0, undersea fibre optic cable with additional capability to analyse and process the data received from space.22

Sector skilled workforce

A skilled workforce is essential for companies in Space 2.0. The industry needs a ‘knowledge’ workforce across a range of sectors relevant to the space industry, including:

• manufacturing and technology
• mining, and
• aviation and defence.

Manufacturing and technology

The space industry is best located where there is existing capabilities in advanced manufacturing, 3D printing, high-tech materials, earth observation, remote asset management and robotics, which have been primarily developed through other industries such as agriculture and mining.23 Manufacturing and technology capabilities will provide:

• Manufacture of components for launch vehicles.24
• Development of virtual technology and software used for space-related purposes.25

Mining

The space industry is often well served by significant mining expertise, which provides unique opportunities in the space sector.26

Autonomous systems that have been developed for use in mining, such as control centres to manage trucks and robotics, can be adapted and used to manage space activities.27

The mining industry offers opportunity to develop and test robotics and autonomous systems designed for space.28 As was highlighted in the inquiry:

This is the right time for Australians to bring the ingenuity they have brought to operating in remote, harsh environments to bear in the next international steps planned to the Moon and on to Mars.29

Aviation and Defence

A local space industry is best when it is developed in collaboration with aviation and defence. A ‘very robust aerospace sector’ with a large number of aerospace primes and SMEs that are engaged in space activities provides a natural linkage to a broader space sector.30

Space related research, development and education

The space industry and its supply chain needs partnerships with world class universities and research centres that are enthusiastic to see the space industry advance.

Education systems that place an emphasis on science, technology, engineering and mathematics (STEM), are well positioned to develop the space industry and capitalise on emerging opportunities.31

Committee Chair Mr Chris Whiting MP discusses robotic research with Professor Michael Milford, Queensland University of Technology, School of Electrical Engineering and Computer Science.

Next steps for the Inquiry

The State Development, Natural Resources and Agricultural Industry Development Committee is due to table its final report on 28 February 2019.

State Development, Natural Resources and Agricultural Industry Development Committee Members

Mr Chris Whiting MP, Member for Bancroft (Chair)
Mr Pat Weir MP, Member for Condamine (Deputy Chair)
Mr David Batt MP, Member for Bundaberg
Mr James (Jim) Madden MP, Member for Ipswich West
Mr Brent Mickelberg MP, Member for Buderim
Ms Jessica (Jess) Pugh MP, Member for Mount Ommaney

Further information on this inquiry can be found at: https://www.parliament.qld.gov.au/work-of-committees/committees/SDNRAIDC/inquiries/current-inquiries/10SPACE

The committee secretariat can be contacted on: (07) 3553 6623 or sdnraidc@parliament.qld.gov.au
ENDNOTES

1 Space Industry Association of Australia, Submission 8, p 2.
2 Ms Denise Johnston, Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP), public briefing transcript, Brisbane, 15 October 2018, p 2.
3 Products for Industry, Submission 7, p 1.
5 Products for Industry, Submission 7, p 2.
6 Professor Michael Smart, Submission 13, p 1.
8 Mr Duncan Blake, International Aerospace Law and Policy Group, public hearing transcript, Brisbane, 16 November 2018, p 39; Air-Vice Marshal (retired) Neil Hart, Chair, Queensland Space Industry Reference Group, public hearing transcript, St Lucia, 19 October 2018, p 46.
9 Professor Michael Smart, UQ, public hearing transcript, St Lucia, 19 October 2018, p 5; Mr Adam Gilmour, Gilmour Space Technologies, public hearing transcript, Brisbane, 16 November 2018, p 13.
10 Professor Michael Smart, UQ, public hearing transcript, St Lucia, 19 October 2018, pp 5, 8; Mr Nick Green, Products for Industry, public hearing transcript, St Lucia, 19 October 2018, p 37.
11 Mr James Minchinton, Submission 12, p 6.
12 Mr Adam Gilmour, Gilmour Space Technologies, public hearing transcript, Brisbane, 16 November 2018, p 13.
15 Mr Peter Kinne, Regional Director, Australasia, DigitalGlobe, public hearing transcript, Brisbane, 16 November 2018, pp 31-32.
16 Air-Vice Marshal (retired) Neil Hart, Chair, Queensland Space Industry Reference Group, public hearing transcript, St Lucia, 19 October 2018, p 45.
17 Air-Vice Marshal Neil Hart (retired), Chair, Queensland Space Industry Reference Group, public hearing transcript, St Lucia, 19 October 2018, p 48.
18 CSIRO, Submission 5, pp 6-8.
19 Mr Peter Kinne, DigitalGlobe, public hearing transcript, Brisbane, 16 November 2018, p 33; DSDMIP, Submission 16, p 2.
20 Ms Denise Johnston, DSDMIP, public briefing transcript, Brisbane, 15 October 2018, p 5.
21 Mr Peter Kinne, DigitalGlobe, public hearing transcript, Brisbane, 16 November 2018, p 33.
22 Ms Denise Johnston, DSDMIP, public briefing transcript, Brisbane, 15 October 2018, p 3.
23 Air-Vice Marshal (retired) Neil Hart, Chair, Queensland Space Industry Reference Group, public hearing transcript, St Lucia, 19 October 2018, p 44.
24 Mr Adam Gilmour, Gilmour Space Technologies, public hearing transcript, Brisbane, 16 November 2018, p 14.
25 Dr Jason Armstrong, Boeing Research and Technology Centre, public hearing transcript, St Lucia, 19 October 2018, p 54.
26 Ms Rhonda O’Sullivan, Submission 9, pp 3, 9.
29 Ms Pam Melroy, Nova Systems, Submission 24, p 1.
30 Ms Denise Johnston, DSDMIP, public hearing transcript, St Lucia, 19 October 2018, p 47.
31 Ms Robyn Rosengrave, Department of Education, public briefing transcript, Brisbane, 12 November 2018, p 1.