



Department of  
**State Development,  
Manufacturing,  
Infrastructure and Planning**

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**11 OCT 2018**

Mr Chris Whiting MP  
Chair – State Development, Natural Resources and Agricultural Industry Development  
Committee  
Parliament House  
George Street  
BRISBANE QLD 4000

Email: [sdnraidc@parliament.qld.gov.au](mailto:sdnraidc@parliament.qld.gov.au)

Dear Mr Whiting

Thank you for your letter of 17 September 2018 about the inquiry into job creation opportunities in Queensland arising from the establishment of an Australian space industry (the inquiry).

The Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) is the Queensland Government's lead agency for space industry development. Please find attached DSDMIP's written submission to the inquiry. The submission was developed in consultation with agencies in the government space industry working group that DSDMIP chairs: the Department of Environment and Science; the Department of Innovation, Tourism Industry Development and the Commonwealth Games; the Department of Natural Resources, Mines and Energy; the Department of the Premier and Cabinet; and Queensland Treasury.

In accordance with the guidelines for written submissions to parliamentary committees, I request you please keep confidential those parts of the submission which note DSDMIP's confidential technical and economic assessments. These assessments will be used to inform the government's response to your committee's report to Parliament on 28 February 2019.

DSDMIP looks forward to the departmental briefing on 15 October 2018 and stands ready to assist the committee as it may require during the inquiry.

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Yours sincerely



Rachel Hunter  
**Director-General**

Department of State Development, Manufacturing, Infrastructure and Planning

# Submission

in relation to the

## **Inquiry into job creation opportunities in Queensland arising from the establishment of an Australian space industry**

by the State Development, Natural Resources and  
Agricultural Industry Development Committee of the  
Queensland Legislative Assembly

**October 2018**

## Introduction

As the agency that sets and drives an economic agenda for Queensland, stimulates industry growth and creates jobs for all Queenslanders, the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) welcomes the opportunity to provide a written submission on the terms of reference for the inquiry into job creation opportunities in Queensland arising from the establishment of an Australian space industry (the inquiry).

“Space 2.0”, the recent commercialisation of space has spurred the development of a US\$345 billion global space industry, three-quarters of which has been driven by the private sector.<sup>1</sup> The value of this industry is forecast to triple by 2040.<sup>2</sup>

Australia’s space industry currently only generates around \$3 to 4 billion in revenue, employing some 10,000 full-time equivalents.<sup>3</sup> After many decades of limited government and commercial activity in the sector, the opportunity for growth is significant. The newly established Australian Space Agency has a mandate to triple the size of the domestic space industry up to \$12 billion by 2030 and generate 20,000 new jobs.

Queensland is well-placed, due to its existing industry and research sector strengths and natural advantages (particularly in regional areas), to secure a significant share of Australia’s space opportunities and to benefit from greater access to space-related capabilities (for example, agriculture and mining).

Space is a logical progression for Queensland’s nation-leading aerospace industry. The state has a highly skilled workforce and a strong research base in both the civil and military sectors. This expertise and skill will be adaptable and transferrable to an emerging space sector.

Because Australia is coming relatively late to the full development of its space industry, and due to the country’s scale and the differing capabilities of its jurisdictions, a ‘Team Queensland’ as part of a ‘Team Australia’ approach appears practical – and is being encouraged by the Australian Space Agency and the existing industry and research players in the sector.

This submission sets out:

- DSDMIP’s framework, governance and priority actions for space industry development under the recently released *Queensland Aerospace 10-Year Roadmap and Action Plan*

<sup>1</sup> Bryce Space and Technology, LLC (2018) *Global Space Industry Dynamics*, Federal Department of Industry, Innovation and Science:  
[www.industry.gov.au/sites/g/files/net3906/f/June%202018/document/extra/global\\_space\\_industry\\_dynamics\\_-\\_research\\_paper.pdf](http://www.industry.gov.au/sites/g/files/net3906/f/June%202018/document/extra/global_space_industry_dynamics_-_research_paper.pdf)

<sup>2</sup> Morgan Stanley (2017) *Space: investing in the Final Frontier*, Morgan Stanley:  
[www.morganstanley.com/ideas/investing-in-space](http://www.morganstanley.com/ideas/investing-in-space) cited in: Expert Reference Group (2018) *Review of Australia’s Space Industry Capability*, Federal Department of Industry, Innovation and Science:  
[www.industry.gov.au/sites/g/files/net3906/f/June%202018/document/pdf/review\\_of\\_australias\\_space\\_industry\\_capability\\_-\\_report\\_from\\_the\\_expert\\_reference\\_group.pdf](http://www.industry.gov.au/sites/g/files/net3906/f/June%202018/document/pdf/review_of_australias_space_industry_capability_-_report_from_the_expert_reference_group.pdf)

<sup>3</sup> ACIL ALLEN (2017). *Australian Space Industry Capability*, Federal Department of Industry, Innovation and Science:  
[www.industry.gov.au/sites/g/files/net3906/f/June%202018/document/extra/australian\\_space\\_industry\\_capability\\_-\\_a\\_review.pdf](http://www.industry.gov.au/sites/g/files/net3906/f/June%202018/document/extra/australian_space_industry_capability_-_a_review.pdf)

- an introduction to Queensland's space industry capabilities
- Queensland's greatest strengths in the emerging space industry based on DSDMIP's initial investigations.

## DSDMIP's space industry development framework, governance and priority actions

### Queensland Aerospace Roadmap

In 2015, the Queensland Government as part of the now \$650 million *Advance Queensland* program, identified aerospace as one of six industry sectors with significant growth potential and in which the state has competitive strengths. The others were advanced manufacturing, biofutures (industrial biotechnology), biomedical, defence industries, and mining equipment, technology and services (METS).

To assist these industries to realise their full potential and become major contributors to Queensland's future economic growth, DSDMIP developed a series of industry development strategies called "roadmaps", which guide how industry, the research sector and government can work together to advance these industries over the next decade and beyond.

These roadmaps and their supporting action plans, including aerospace, were developed through extensive consultation with industry, the research sector and civil society.

In the Queensland context, space industries are considered part of the aerospace sector. The Queensland Government released the [Queensland Aerospace 10-Year Roadmap and Action Plan](#) (Aerospace Roadmap) on 17 June 2018. The Aerospace Roadmap's vision is that: *"by 2028, the Queensland aerospace industry will be recognised as a leading centre in Australasia and South East Asia for aerospace innovation in training; niche manufacturing; maintenance, repair and overhaul (MRO); and unmanned aerial systems (UAS) applications for military and civil markets"*.

Space industry related actions in the Aerospace Roadmap include:

- investigating supply chain and training skills requirements for future development of the state's hypersonics industry
- investigating the potential and economic cost-benefit of Queensland developing capacity in services for small and private satellite launch and other space industry capabilities
- promoting Queensland industry capability to national and international civil and military aerospace markets

- working with Queensland industry and research organisations to strengthen aerospace capability by establishing Queensland as an international hub for unmanned aerial systems
- working with the aerospace industry to help Queensland companies enter global supply chains.

DSDMIP has a wide range of functions to drive and facilitate aerospace and space industry development including industry attraction, planning, regional economic development, infrastructure policy and planning, project facilitation and development, and property development.

In addition, and part of but separate to DSDMIP, the Office of the Coordinator-General (OCG) has wide ranging powers to facilitate large-scale and complex projects, including land acquisition and project delivery associated with the Queensland aerospace and space industries.

### **DSDMIP space industry development work underway**

To implement the space-industry related actions in the Aerospace Roadmap, DSDMIP is currently undertaking the following work:

- in May 2018, DSDMIP commissioned an engineering firm to progress a confidential technical study on Queensland's space industry. The technical study focused on the space industry value chain and Queensland's potential strengths from a technical engineering perspective
- in October 2018, DSDMIP is engaging a professional services firm to extend the existing aerospace capability matrix and undertake a confidential capability audit to identify gaps and produce a Queensland space industry matrix (companies, research organisations, infrastructure, supply chains) and economic impact analysis to quantify the future potential jobs and economic growth that may be generated within the state economy.
- in October 2018, DSDMIP is also engaging a professional services or engineering firm to carry out a confidential feasibility siting options study for a satellite park and launch facilities that build on Queensland's potential strengths in the sector.

The intention of the DSDMIP work outlined above is to provide a robust technical and economic evidence base to assist the Queensland Government to formulate a comprehensive policy position on space industry development. When completed, the confidential reports will be provided to the State Development, Natural Resources and Agricultural Industry Development Committee (the committee) on a confidential basis.

### **Queensland Government – space industry governance**

The establishment of effective cross-sectoral governance arrangements has proved essential to the development of the Queensland Government's priority industry sectors. In June 2018, DSDMIP established the Queensland Space Industry Reference Group of major companies in the aerospace industry (referred to in the

industry as “primes”), small and medium enterprises (SMEs), and research institutions to help guide the space industry’s development.

This group is chaired by the Queensland Government’s Strategic Defence Advisor for Aerospace, the former deputy head of the Royal Australian Air Force, Air Vice-Marshal Neil Hart AM (ret). In addition, the group comprises:

- Dr Shane Arnott – Director, Boeing Phantom Works International
- Stu Blackwell – Manager Communications Programs, Northrop Grumman
- Professor David Buttsworth – School of Mechanical and Electrical Engineering (Thermofluids), University of Southern Queensland
- Adam Gilmour – Founder and CEO, Gilmour Space Technologies
- Nick Green – Project Manager, PFI (Products for Industry)
- Tammy Halter – Director, Absolute Data Systems
- Peter Kinne – Regional Director, APAC/Australasia, DigitalGlobe
- Derek Lockett – Director of Sales Asia-Pacific, Honeywell
- Peggy MacTavish – Vice President, Civil & Defence Services, Elbit Systems of Australia
- Professor Michael Smart – Chair of Hypersonic Propulsion, University of Queensland
- Dr Dave Williams – Executive Director, Digital National Facilities and Collections, CSIRO

The Queensland Space Industry Reference Group works alongside a whole-of-government working group to ensure a coordinated ‘Team Queensland’ approach between industry, the research sector and government. The government working group, chaired by DSDMIP, has senior representatives from agencies active or with a strategic interest in the space value chain: the Department of Environment and Science; the Department of Innovation, Tourism Industry Development; the Department of Natural Resources, Mines and Energy; the Department of Premier and Cabinet; and Queensland Treasury. These agencies were consulted in the development of DSDMIP’s submission.

## Queensland’s space industry capabilities – an introduction

The following section of this submission introduces Queensland’s space industry capabilities, noting DSDMIP’s confidential work referred to above to more deeply audit the state’s capabilities.

## Asia-Pacific aerospace hub

### Industry

Queensland's emerging space industry is developing an aerospace industrial base that is a leading Asia-Pacific hub and has expertise in:

- advanced manufacturing
- advanced intelligent surveillance
- aerospace technologies development
- composites development
- earth observations, data processing and analytics
- niche machining
- propulsion systems
- thermal treatment
- unmanned systems development
- robotics and automation.

The state also has many companies contracting to national and international defence forces. This means local aerospace industry is accustomed to producing products and services of the highest standard and working in a tightly regulated environment.

The aerospace sector contributes significantly to Queensland's economy and jobs. In 2015-16, Queensland's aircraft manufacturing and repair businesses generated approximately \$1.2 billion in revenue and contributed \$565 million to Queensland's economic growth.<sup>4</sup> The state's aircraft manufacturing and maintenance sector alone provides over 4,200 jobs across more than 300 enterprises.<sup>5</sup>

Queensland has developed a growing presence in the aerospace industry. This includes Virgin Australia's headquarters and a significant presence by half of the world's top 10 aerospace companies (ranked in terms of total turnover) in Queensland, such as Boeing Defence Australia (including its R&D arm), Airbus, Northrop Grumman and Raytheon.

Queensland is also home to Australia's largest Defence airbase, the Royal Australian Air Force (RAAF) Base Amberley, with its 70 aircraft, six fleets and more than 5,800 personnel. The redevelopment of the Amberley base will see this number grow to more than 7,000 military and civilian personnel by 2020.

The Queensland Government has taken a number of policy, planning and practical steps in recent years to advance the use of unmanned aerial systems (i.e. drones) in the state. This has included the creation of an innovation environment supported by the Advance Queensland initiative that has led to Boeing establishing its largest autonomous systems project outside the United States of America (USA) here (as announced in March 2018). The state is also home to the internationally renowned annual Unmanned Aerial Vehicle Challenge, which pushes boundaries in autonomous systems development.

<sup>4</sup> Deloitte Access Economics (2017), *Economic impact analysis of DSD Priority Sectors*, Department of State Development, Manufacturing, Infrastructure and Planning.

<sup>5</sup> IBISWorld (2017) *Aircraft Manufacturing and Repair Services in Australia*, IBISWorld.



Companies with a significant presence in Queensland that are either directly active in the space industry or aerospace supply chains span: manufacturing; information technology, media and telecommunications; and professional, scientific and technical services industrial classifications. They include:

- Absolute Data Group
- Airbus
- BAE Systems
- Black Sky Aerospace
- Boeing Defence Australia
- Crystalaid Manufacture
- DigitalGlobe
- Elbit Systems of Australia
- EM Solutions
- Esri Australia
- Ferra Engineering
- Gilmour Space Technologies
- Harris Corporation
- Heat Treatment Australia
- Hypersonix
- Imagus
- ImmersaView
- Insitu Pacific
- Intellidesign
- L3 Micreo
- Lavender Composites
- Northrop Grumman
- Nova Systems
- Ozius
- Products for Industry (PFI)
- Qantas
- QinetiQ
- Raytheon
- Teakle Composites
- Teledyne Australia.

Queensland firm Gilmour Space Technologies is one of Australia's few active space rocket companies. The firm designs and manufactures propulsion systems which deliver small low-cost satellites into space and recently raised \$19 million in venture capital backed by CSIRO (Main Sequence Venture and Blackbird Ventures) towards the launch of its first commercial hybrid rocket (Eris-100) into space in 2020.

Space-related products and services are used in virtually every sector of the Australian economy and are important to the ongoing economic productivity of industry sectors including transport, logistics, mining and agriculture.

Queensland has the opportunity to draw on its strengths in sectors like mining-METS and agriculture and connect them to the space industry. There is significant potential to tap into the space economy through converting their world-leading technologies and make them 'space ready'.

Queensland's mining-METS sector's remote asset management and remote sensing technologies present world-leading competitive advantages in the development of technologies, products and services targeted at the extraction of valuable geological materials in space (e.g. the Moon, Mars, asteroids).

Similarly, the state's agricultural sector's developments in precision agriculture also leverage opportunities that are directly transferable to the space industry.

### **Research and development capabilities**

Queensland-based institutions are conducting world class research that feeds into the state's space industry. This includes:

- University of Queensland:
  - the Centre for Hypersonics is a world leader in the development of hypersonic technology and has been conducting targeted research in this area for more than 20 years.
  - the Terrestrial Ecosystem Research Network (TERN), which the university hosts, has recently collaborated with NASA to study global climate.
  - the Centre for Advanced Materials Processing and Manufacturing (AMPAM) has significant expertise in materials engineering and manufacturing activities.
  - the Boeing Research and Technology (BR&T) Australia Centre has been recently established.
  - X3 expansion tube facility which is capable of studying superorbital gas dynamic flows (i.e. the properties and behaviour of fuels in space propulsion systems).
- Queensland University of Technology:
  - the university is home to the Asia-Pacific-leading Australian Centre for Robotic Vision.
  - the former host of the Australian Research Centre for Aerospace Automation (ARCAA). ARCAA played an integral role in building Australia's unmanned aircraft system industry over a 10-year period and the work of ARCAA is now captured under QUT's robotics and autonomous systems discipline.
  - Institute for Future Environments is developing new technologies and methods for collecting and analysing big data through its IntelliSensing program.
- CSIRO:
  - CSIRO's Brisbane facility includes the Queensland Centre for Advanced Technologies (QCAT). This is Australia's largest integrated research and development precinct for the resources and associated advanced technology industries. Research areas include autonomous systems, smart mining and advanced aeronautical engineering.

- The Department of Defence's Science and Technology (DST) Group and CSIRO's nation leading ICT organisation, Data61, are located at QCAT.<sup>6</sup>
- University of Southern Queensland:
  - Institute for Advanced Engineering and Space Sciences has nationally leading applied research and commercial work in composites, hypersonics, robotic vision in uncontrolled environments and astronomy.
  - Mount Kent Observatory is Queensland's only professional research observatory.
  - Shared Skies Partnership with the University of Louisville in Kentucky, USA, allows for remote access to telescopes around the world for live astronomical viewing.
- Griffith University:
  - The Institute for Integrated and Intelligent Systems specialises in artificial intelligence, computer image processing and robotics.
- Queensland's education sector:
  - Queensland's Gateway to Industry Schools program provides a conduit between the education sector and industry to help prepare students for the workforce. The six industry groups represented include aerospace, manufacturing and engineering.
  - Aviation High in Brisbane provides education tailored to careers in aviation and aerospace.
  - Brisbane Grammar School has robotic telescopes at the Dorothy Hill Observatory to help build space interest and future capability.

### Queensland's education sector

The jobs of tomorrow will be filled by the highly educated and skilled Queensland students of today.

With this in mind, and with employment in STEM growing twice as fast as non-STEM occupations, the Queensland Department of Education has developed a STEM strategy, in alignment with the Advancing Education plan, #codingcounts (a focus on coding and robotics in Queensland schools) and a STEM hub, and online information and advice resource for students and parents wanting to learn more about STEM.

The Queensland Government also has a priority on attracting more females into the manufacturing sector. As part of the Advanced Manufacturing 10-Year Roadmap and Action Plan, the Women in Manufacturing program was launched this year. This important initiative includes six regional networking and mentoring events, each

<sup>6</sup> Development of a space industry in Queensland has been identified by Data61 as a significant growth opportunity over the coming decade: Data 61 (2017) *Opportunities for Growth - Driving forces creating economic opportunities for Queensland companies over the coming decade*, Queensland Futures Institute; [www.qldfutures.com.au/wp-content/uploads/2017/01/QFIs-Opportunities-for-Growth-Report.pdf](http://www.qldfutures.com.au/wp-content/uploads/2017/01/QFIs-Opportunities-for-Growth-Report.pdf).

involving a panel of three prominent women from advanced manufacturing discussing the evolution of the sector and the future role of women within it, the importance of mentoring the next generation of females in the sector and the significance of establishing supportive networks.

Part of the Women in Manufacturing program includes a breakfast event during International Women's week and three regional student tours where female STEM students participate in a factory tour to encourage them towards a career in advanced manufacturing.

The Aerospace Gateway to Industry Schools program was established by the Queensland Government in 2001 to support the growth and development of an effective workforce for the aerospace sector. Part of this program includes the 2018 Aerospace Industry Education Awards, worth \$25,000 in scholarships and prizes rewarding the efforts and achievements of the students and their teachers in participating schools in the Aerospace Gateway to Industry Schools program.

Queensland industry continues to engage with teachers and students in other hands-on ways, as their interest and knowledge in the space economy grows. Queensland-based PFi is partnering with Ormeau State School for a proposed How to Build a Rocket series in 2019 as part of the Science of Rockets subject, with students designing and building a miniature launch vehicle.

The Queensland Government's Indigenous Strategy identifies the significant land holdings Indigenous communities and groups hold which could be used for space related projects, for both education and commercial purposes. These projects have the potential to attract both public and private investment and, most importantly, create employment, training, supply chain and economic development opportunities for Indigenous communities.

Queensland has also recently been chosen as the location for Australia's first Defence Cooperative Research Centre for Trusted Autonomous Systems (i.e. autonomous air, land and sea vehicles), a \$101 million national initiative. As part of this, the Queensland Government is investigating the creation of a dedicated test, trial and evaluation site for autonomous systems in regional Queensland.

Queensland is also preparing a bid to develop an earth observation analytics hub. The aim is to position Australia as a global leader in the use of current and next generation satellite data by linking industry, research organisations and government.

As part of the Advance Queensland initiative, the \$15 million IndustryTech Fund is expected to be launched imminently. This fund will help projects to develop and deploy advance technologies like robotics, artificial intelligence, autonomy and big data. This program will back game-changing projects that combine and leverage the know-how of startups, SMEs, researchers and industry partners.

From 2019, the Advance Queensland Industry Research Fellowships program will consider clusters of applicants – up to four researchers, from different Queensland universities – who can apply together for up to \$1.2 million for proposals which aim to support research that boosts entrepreneurship and SME growth in the state.

## Geographic and infrastructural strengths

Queensland is Australia's gateway to the Asia-Pacific region. The state has a range of geographic and infrastructural strengths that, alongside its industrial and R&D strengths, uniquely and ideally prime Queensland for space industry development.

Queensland is Australia's second largest state, spanning 1.7 million square kilometres. The availability of wide open space with easy access to major industrial hubs and regional support centres can support space industry activities. These hubs have good road and rail access as well as proximity to the state's six international airports.

Queensland's position on an eastern seaboard close to the equator, plus its low population density and low radio interference, provides benefit for potential satellite park, earth observation data analytics, and testing and launch facilities.

An international broadband submarine cable is planned to connect to the Sunshine Coast by 2020, improving the ICT capacity of Australia's east coast.

## Queensland's greatest strengths in the emerging space industry – initial investigations

In reference to its position as an Asia-Pacific aerospace hub, and the state's geographic and infrastructural strengths, DSDMIP's initial investigations are examining Queensland's strengths in the emerging space industry within the following categories:

- Space-based sensing (i.e. from satellites):
  - earth observation
  - data analysis and exploitation
- Space-based services (i.e. from satellites):
  - communications
  - position, navigation and timing
- Space systems support:
  - launch and recovery
  - monitoring and control
- Space systems design and manufacture:
  - vehicles and orbital propulsion (e.g. rockets)
  - payloads (e.g. satellites)
  - ground stations and equipment (e.g. such as satellite parks)
  - autonomous systems, artificial intelligence and machine learning.

DSDMIP's current work – the capability audit and economic impact analysis, and satellite park and launch facilities feasibility siting options study – should provide robust technical and economic evidence confirming these strengths. Further investigations

should also indicate which strengths could be pursued to yield the most benefits for Queensland over the short, medium and long term. The results of these investigations will be provided to the committee on a confidential basis prior to 28 February 2019.