



Queensland University of Technology

Response to the House Standing Committee on Industry, Innovation, Science and Resources *Inquiry into Developing Australia's Space Industry*

Queensland University of Technology (QUT) welcomes the opportunity to contribute to the Committee's *Inquiry into Developing Australia's Space Industry*.

QUT supports the Federal Government's efforts to grow Australia's civil space industry while preserving and protecting the space environment. We welcome the establishment of the Australian Space Agency and commend the Agency on its early achievements, including the formation of the *Moon to Mars* program.

QUT has enjoyed robust engagement with Australia's emerging space sector and with the Australian Space Agency since its inception, assisting the Agency in developing the *Robotics and Automation Roadmap*¹ and supporting conversations between the Agency and NASA on key aspects of the *Moon to Mars* program in a technical capacity.² Additionally, QUT Vice-Chancellor and President Professor Margaret Sheil AO is a member of the Agency's Advisory Board and Distinguished Professor Peter Corke a member of the Robotics and Automation Technical Advisory Group.

The presence of broad and deep technical and scientific knowledge, internationally renowned research capacity, strong and interlinked collaborative networks, and a proven talent pipeline uniquely place the Australian university sector to develop and commercialise the technologies that will give Australian space companies a competitive edge in the global market. Currently, the Australian space industry is defined narrowly in a manner that privileges private investment, marginalises universities and places a hard cap on the fledgling sector's ability to grow.

In order to foster the potential of Australia's space industry, QUT proposes that the Federal Government evolve a more holistic approach to sector development by creating more equitable development, funding and commercialisation systems, developing Australian data talent, engaging with key international partners and showcasing Australian universities' world-leading space programs internationally.

¹ The Roadmap is still in production.

² See, for instance:

- Backing Australian business, jobs for the US Moon to Mars Mission. <https://www.pm.gov.au/media/backing-australian-business-jobs-us-moon-mars-mission> (My preference).
- Donald Trump's Mars mission given \$150m boost from Scott Morrison as NASA shows off Gold Logie. <https://www.abc.net.au/news/2019-09-22/scott-morrison-backs-nasa-moon-mars-mission-with-donald-trump/11536368>
- Moon to Mars: opportunities for Australian businesses. <https://www.industry.gov.au/funding-and-incentives/moon-to-mars-opportunities-for-australian-businesses#:~:text=The%20Moon%20to%20Mars%20initiative%20is%20a%20result,has%20designed%20three%20integrated%20elements%20to%20the%20initiative>

For the convenience of the Committee, the following remarks address the inquiry's Terms of Reference.

A. Development of space satellites, technology and equipment

QUT endorses the Australian Space Agency's focus on Earth observation and welcomes the Federal Government's support for industry-linked research initiatives such as the SmartSat CRC.³ Space-based data promises to deliver substantial gains for key rural and remote industries, improve our responsiveness to natural disasters and enhance our environmental protection.

The continued support and development of Australian data researchers, data analysts and data scientists – currently a critical gap in the national workforce – will ensure the accessibility and usability of space-based data for these purposes, amplifying returns on satellite investment, research and development. Universities play a crucial role in this pipeline, and Australia's support for research and teaching in space-relevant disciplines will be critical to producing skilled graduates who can perform in their field and connect to the global industry.

B. International collaboration, engagement and missions

The higher education and research sector makes a vital contribution to Australia's national interest, fostering international collaborations and furthering the success of the Australian space industry. QUT's key international partnerships in this arena include:

- NASA: development of robust robotic vision techniques for controlling a drilling robot arm on the Perseverance Rover.⁴
- NASA: development of software to analyse scientific data that will be captured by the Perseverance Rover.⁴
- Asian Office of Aerospace Research & Development (AOARD): Fundamental research to understand how humans form trust with robots and autonomous systems.⁵

QUT commends the Agency's work in concluding SOIs with international space agencies. Universities will play a leading role in delivering on Australia's commitments under these bilateral space agreements through robust teaching and research programs and links with local and international industry partners.

We encourage the Australian Space Agency to continue its engagement at key international space fora such as the International Astronautical Congress and the Colorado Space Symposium, and to continue to provide a platform for Australian universities to profile their world-leading space programs. QUT further encourages the Agency to showcase Australia's powerful space capability to visiting delegations, beyond the expertise located in South Australia.

³ QUT partners with Government, business and Australian universities on SmartSat CRC: <https://smartsatcrc.com/about/about-us/>

⁴ QUT creating software for Mars Perseverance Rover mission. <https://www.qut.edu.au/news?id=170033>

⁵ US Air Force / AOARD: An infinitely scalable learning and recognition network. <https://research.qut.edu.au/qcr/Projects/us-air-force-aoard-an-infinitely-scalable-learning-and-recognition-network/>

C. Commercialisation of research and development, including flow-on benefits to other industry sectors

QUT notes the nascency of Australia's space industry, in which the majority of domestic space firms are start-ups and SMEs who often lack both the resources to conduct effective research programs and the experience to drive commercialisation outcomes. Australian universities have the capacity to fill this gap, drawing upon large space research and development programs, sophisticated commercialisation offices and links to large international space firms.

Australian universities are ideally positioned to develop commercial space products and services. However, the university sector faces several key challenges.

1. Critical funding to support commercial outcomes is inaccessible to universities

Australian Space Agency funding is focused on industry outcomes and Australian universities share this goal: we work with large international space primes, licence the results of our research and spin out space companies. However, Australian universities have been prevented from competing on an equal footing with Australian companies. For instance, approximately one-third of the \$150 million funding allocated for the Australian Space Agency's *Moon to Mars* program is accessible by Australian companies only (Supply Chain Capability Improvement Grants). We urge the Federal Government to adopt a broader view and allow universities to be eligible for all competitive space funding programs.

2. Assumptions that Australia's traditional large industries will co-invest in space programs is unfounded

The *Moon to Mars* program is premised on the capacity for Australia's unique terrestrial heritage to be "spun in" to support the Artemis program, for space technologies involved in remote operations, robotics, automation and ISRU activities to benefit Australia's large industries, particularly our resources sector.

While experience has demonstrated Australia's large resources companies' interest in utilising the results of any technologies that QUT develops, the notion that traditional resources companies will co-invest in space programs at the level of a "Trailblazer" initiative in the near future is both unfounded and – absent early and focussed stakeholder engagement – doubtful.

More robust dialogue between the Federal Government, Australian Space Agency and large resource companies is key to ensuring the aforementioned flow-on effects between space and the resources sector.

3. Access to venture capital is limited

Despite the success of companies like Fleet and Gilmour Space Technologies in raising venture capital, options to access capital in Australia are limited. A government fund in the vein of The Biomedical Translation Fund, properly linked to university commercialisation offices and focused on providing significant early-stage funding for space companies, would assist development and commercialisation.

D. Future research capacity, workforce development and job creation

QUT's space industry partners frequently cite access to talent as one of their key business challenges. QUT professionals work closely with business and research partners to ensure graduates are meeting the sector's skills needs, including by tailoring our course content and facilitating work integrated learning programs.

QUT also faces COVID-related workforce constraints, given space research hires are often internationally sourced. However, we do observe a recent upswing in talent wishing to return to Australia and the downturn in key space-related industries such as the automated vehicle industry in the USA. This provides a window of opportunity for Australia to facilitate entry for highly skilled space workers to Australia.

To capitalise on this opportunity, QUT proposes that Australia implement visa program policies that facilitate Australia's ability to attract international talent, including:

- expedited visa processes to minimise barriers to talent mobility;
- supportive spouse/partner and dependent policies to assist in attracting talent;
- international recruitment strategies targeting those with priority skillsets;
- funding and scholarships for space-related higher degree research;
- incentive for Australian companies to offer work experience or internship opportunities to high-potential students studying in Australia or on a post-study work visa;
- mutual recognition of qualifications between relevant partner institutions;
- increased access to research infrastructure for international talent; and
- talent exchange with international partners.

The fast track option allowing for preferential treatment as part of the skilled migration program is the key recommendation, incorporating supportive spouse and dependent policies. Combined with prioritised industry support, fast track is the one policy that has the capacity to ramp up Australia's capability over a short time-frame, taking advantage of the early work of competitor nations.