SMARTSAT Cooperative Research Centre

Australian Government Department of Industry, Innovation and Science | Business Cooperative Research Centres Program

A submission from the SmartSat Cooperative Research Centre to the *5 Year Productivity Inquiry: Australia's data and digital dividend* Interim Report

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Purpose

This document is submitted by SmartSat CRC [1] in response to the *5 Year Productivity Inquiry: Australia's data and digital dividend* Interim Report 2, for consideration by the Productivity Commission when reviewing Australia's productivity performance and recommending an actionable roadmap to assist governments to make productivity-enhancing reforms.

SmartSat CRC would like to formally acknowledge, through this submission, the value already being gained from space data, and to emphasise the opportunity to have space-derived data put more firmly on the national agenda.

Who we are

Established in 2019, SmartSat CRC is Australia's space industry research & development and innovation ecosystem. SmartSat has a partner network encapsulating the majority of Australian space Industry and Universities, has conducted background capabilities and skills mapping, and is executing a research and technology development program to build capability for the benefit of Australia. Our mission is to help build an Australian sovereign space capability and deliver national benefits, including supporting the activities of the Australian Space Agency. Furthermore, SmartSat CRC has a strong connection with relevant stakeholders including universities, industry, other CRCs and a range of government agencies, especially the Department of Defence as well as CSIRO, Geo-science Australia, the Bureau of Meteorology and various Centres of Excellence. Our R&D programs include advanced communications, focusing on both RF and laser communications, intelligent satellite systems with on-board machine learning capabilities, and next generation earth observation analytics and advanced remote sensors.

Our primary response to the request for submissions is that the *5 Year Productivity Inquiry: Australia's data and digital dividend* interim report, has a concerning lack of focus on the use of space data as a means of informing decisions at a national level and the negative impact this has on productivity across many sectors of our economy. Emerging technologies around earth observation and advances in satellite communications, particularly relating to the Internet of Things (IoT), are resources that could support effective decision-making in response to economic opportunity across various sectors, including in the two key sectors of agriculture and mining, both of which have shown significant growth[2].

The recommendation put forward in this submission aligns to our research programs and highlights opportunities for the Commonwealth and State governments to harness space data in order to drive innovation and better inform decision-making at a national level. Drawing on these resources will also assist in safeguarding Australia's sovereign capability.

SmartSat CRC R&D and Innovation

A number of examples are given below of SmartSat CRC's Innovation activities that provide data and connectivity for the major sectors of the Australian economy.

[1] https://smartsatcrc.com
[2] Australian Industry, 2020-21 financial year | Australian Bureau of Statistics (abs.gov.au)

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a) Mining & Energy

The Australian Mining and Energy Sector is a world leader in remote operations and utilise space technology to support safety, efficiency, and productivity. However, the sector is only touching the surface when it comes to utilising the full benefits of space technology for data driven decisions. The SmartSat CRC Mining and Energy End User Advisory Board has identified that a top priority for the sector is to improve the effectiveness and sustainability of the sector through enablement of transformative space technologies. Technology advancements and adoption of automation, robotics and data analytics are enablers to transform the Australian Mining and Energy Sector. However, such transformation will fundamentally be underpinned by data which needs to be generated, transmitted, managed, and protected. Much of this relies on satellite-based infrastructure and IOT devices.

For example, during the COVID-19 pandemic, mining and energy organisations were forced to do more with less, and to overcome challenges to remain competitive and support the evolution of business to meet consumer demands around the world. Although these challenges are broad, a common theme was how Remote Operations can help enable and improve data driven decision-making[3]. The sector is relying on data-driven decisions that leverage technology to improve efficiency and worker safety, whilst ensuring sustainability remains at the forefront of operations.

b) Water Quality

Safeguarding Freshwater and Coast Resources

The mission is to safeguard our freshwater and coast resources through satellite technology. The mission covers inland, estuarine and near-coastal water bodies in Australia and globally to facilitate the science and management objectives of:

- Freshwater availability and safe drinking water for communities, which is a critical global issue.
- Improved management of freshwater and coastal water ecosystems.
- Protection of natural ecosystem functions and reduced impacts of contaminants.
- Early detection and improved management and mitigation of extreme events such as fish kills, harmful algae blooms, floods and coral bleaching.
- Detection and discrimination of macro and micro-plastics using hyperspectral remote sensing.
- Estimating land to ocean sediment fluxes using multi-sensor data merging.
- Photo-bleaching and microbial degradation of aquatic organic carbon and its influence on optical remote sensing signature.
- Machine learning (ML) based remote sensing models to map phytoplankton dynamics in sediment rich river flood discharges.
- Market and non-market value of inland and coastal aquatic water quality.

Improving Groundwater Bore Monitoring and Management

The mission is to demonstrate the use of an Internet-of-Things and nano-satellite telecommunications to improve groundwater bore monitoring and management. This collaborative project developed a pilot direct-to-orbit satellite telecommunications solution to transmit and aggregate information collected from ground water bores in rural and regional areas. The project developed a pilot direct-to-orbit satellite telecommunications solution, integrated with an online spatial platform, as an end-to-end cost-effective means to transmit and aggregate, in near real time, automatically collected information from ground water bores in rural and regional areas, with a focus on environmental water monitoring. This improved groundwater readings from yearly to 6 hourly, and improved safety for groundwater monitoring staff. The

[3] AROSE 2021, Australian Remote Operations Capability Report, November 2021.

project successfully deployed 70 groundwater bores with direct to space IoT communication, dramatically increasing our understanding of groundwater as a resource.

c) Defence & National Security

The mission is to enhance communications and situational awareness across the Indo-Pacific region for Australia and its Allies. This aligns with the Australian government's emphasis and priority on enhanced regional engagement covering disaster response, security and economic assistance for neighbouring nations across the Indo-Pacific given the region's strategic realignment, which makes the region more contested and apprehensive. Space-derived data can contribute to regional diplomacy and security partnership especially in the context of humanitarian and disaster relief operations and protection against illegal resource exploitation through maritime surveillance and response.

d) Disaster Resilience

The mission is to develop and harness satellite-based information capabilities to enhance Australia's disaster management and climate change resilience. Natural disasters have been part of the fabric of Australia's existence, with bushfires, floods, and droughts occurring with increasing frequency and severity. Such events can significantly impact societal wellbeing, economic health of communities and national security and there is a strong national focus on improving disaster resilience. The information age provides us with powerful tools to improve disaster resilience through the ability to collect, exploit and disseminate actionable information to a broad community of end users. This includes emerging space technology to augment emergency management contributing significantly to improving resilience.

Our mission is developing new concepts, techniques, technologies and system elements to support emergency management agencies and Australian communities. It aims to provide evidence-based advice for decision makers on the use of space technology to enhance Australia's disaster resilience.

e) Agricultural Intelligence From Space

The mission is to transform Australian agriculture through intelligent space technologies. Australia must increase its sovereign capability to capture and analyse data in order to better monitor and predict the health and performance of the agricultural environment, thus optimising the farming process. The program is currently underway and once realised, will build Australia's sovereign capability in the key sector of agriculture. Space-based, real-time analysis information products will be developed to support:

- Agricultural productivity
- Biosecurity
- Climate
- Decarbonisation
- Soil Health

f) Environment

In partnership with industry, the mission will capitalise on NewSpace opportunities to contribute to a thriving and enduring South Australian space sector and support Australia's national space strategy. Data collected from our satellite can be used for a variety of applications, including informing decisions around water use, climate policy, mining and emergency management.

The following companies could be approached to provide more information on the broader application of space technologies across Australia's economy including:

1. Fleet Space (www.fleetspace.com)
   Fleet Space made history by launching Australia's first four commercial nanosatellites in November 2018. Fleet Space is an agile space company based in South Australia whose mission is to Connect

Everything using cutting-edge communications and space technologies to enable the next giant leap in human civilisation. The company's expertise lies in remote connectivity systems, with Australia's particular connectivity challenges being a major driver in creating new connectivity technologies.

2. Inovor Technologies (www.inovor.com.au)
   Inovor Technologies is an Australian owned and operated company offering specialist development services and satellite mission solutions.

3. Myriota (www.myriota.com)
   Myriota was founded to revolutionise the Internet of Things (IoT) by offering disruptively low-cost and long-battery-life global connectivity. Based in Adelaide, a focal point of the Australian space industry and home of the Australian Space Agency, Myriota has a growing portfolio of over 100 granted patents, and support from major Australian and international investors. With deep heritage in telecommunications research, world-first transmission of IoT data direct to nanosatellite was achieved in 2013. Myriota has made this ground-breaking technology commercially available for partners worldwide.

4. AROSE (www.arose.org.au)
   The organisation was established to leverage existing remote operations expertise in the Australian resource sector and catalyse knowledge transfer between terrestrial and off-earth domains for the benefit of all industries.

Recommendation on how data and digital technologies can drive innovation

It is essential for Australia to be cognisant of the transformative impact of space and space-derived data when considering digital technology and data within the national economy. As there has been no focus on either space or satellite technology as potentially transformative technologies in the interim report, SmartSat CRC recommends that Productivity Commission explores in far greater detail the opportunity for enhanced national productivity through greater utilisation and investment in existing emerging space capabilities.

SUBMISSION ENDS