



Australian Government

**Department of Industry, Science,
Energy and Resources**

Submission

Inquiry into space-based Intelligence, Surveillance and Reconnaissance, maintenance of Defence Estate, and workforce

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Terms of Reference

The Defence Sub-committee of the [Joint Standing Committee on Foreign Affairs, Defence and Trade](#) is conducting a [new inquiry](#), focusing on important aspects of the most recent Annual Report of the Department of Defence including space based intelligence and cyberspace warfare.

The Sub-committee is now inviting written submissions, by 4 August, on any of the following four focus areas:

- Space based Intelligence, Surveillance and Reconnaissance (ISR)
- Cyberspace warfare
- Defence estate in North and Northwestern Australia
- Defence workforce

Space-based ISR

High-quality ISR is essential to government and military decision making. Space-based ISR is becoming both increasingly complex and increasingly critical as an input to the real-time and near-real-time ISR picture required by government and government agencies.

The Sub-committee is interested in the current state of Australian space-based ISR capabilities, its adequacy in the current geo-strategic environment, and what is and should be planned for future Australian space-based ISR.

Cyberspace warfare

Cyber warfare is increasingly the domain in which both 'grey zone' operations and the first offensive actions of conflict are likely to take place. In highly networked societies, governments, and militaries, the security and survivability of ICT systems and associated networks is a significant potential vulnerability.

The Sub-committee is interested in the current state of Australian defensive and offensive cyber warfare capabilities.

Defence Estate in North and Northwestern Australia

Defence has the most extensive land and property holdings in Australia, with over \$28.2 billion of buildings and infrastructure including large training areas and bases close to the coastline, and environmental stewardship for over 3.5 million hectares of land in Australia.

The Sub-committee is interested in the current state of Defence estate in Northern Australia, with respect to its development, maintenance, and capability.

Defence Workforce

The Committee acknowledges that the Defence Workforce is a potentially enormous area for investigation, with many interrelated threads, but it believes there is merit in looking at some broad themes, potentially for future inquiry.

The Sub-committee is interested in hearing views about recruitment, retention, family matters and the reserve workforce.

As an inquiry into an Annual Report, potentially all areas covered by the report are able to be considered, however the Sub-committee hopes to attract written submissions on the four focus areas above at this stage.

Submission response

The Department of Industry, Science, Energy and Resources works closely with the Department of Defence (Defence) to provide greater opportunities for Australian industry in Defence projects, including those requiring space-related capabilities. The department has a key interest in building industrial capability to support a strong defence industry and is committed to understanding how Defence projects contribute to capability development within the Australian industrial base, including nascent capabilities. This includes targeting Defence expenditure towards projects that grow local capability and facilitate skills and knowledge transfer, particularly where highly-skilled, high-value add jobs are created. The use of defence investment to drive cross-cutting capability development is a major focus for the department. The department works to leverage whole-of-government industry policy to build defence industry capability, and plays a key role in understanding how the defence sector creates opportunities for firms to pivot into civil sectors or export supply chains, and for dual-use civilian technology to be used across military applications.

The department, and broader portfolio works with a range of stakeholders to progress these objectives, including through:

- Delivery of the Modern Manufacturing Strategy (MMS), which will enhance Australia's strategic industrial capability, including for Australian owned businesses, through its support for manufacturing. The MMS identifies defence and space as two of the National Manufacturing Priority (NMP) areas. Through the Supply Chain Resilience Initiative (SCRI), the Government is enabling Australian businesses to establish or scale a capability that addresses an identified critical supply chain vulnerability. This includes manufacturing-related capabilities, equipment, technology, skills and processes.
- Administration of the Cooperative Research Centres (CRC) Program. This is a competitive, merit-based grants program that supports industry led collaborations between industry, researchers and the community, which support the development of defence capabilities, particularly relating to defence and space.
- Delivery of the Advancing Space: Australian Civil Space Strategy 2019-2028, to build the size and capability of Australia's space sector, through a focus on the seven Australian Civil Space Priority Areas.
- The National Measurement Institute (NMI) which, as the Australian Government's peak measurement body, supports the defence and space sector by maintaining a broad range of scientific capabilities and services needed to keep technologies and systems at operational readiness.
- The Artificial Intelligence (AI) Action Plan, which supports the Government's plan to build Australia's AI capability to grow the economy and support industry competitiveness, including modernising manufacturing and enhancing Australia's defence and space capabilities.
- Questacon's support of two programs under Australia's Cyber Security Strategy 2020, demonstrating the portfolio's role in the development of cyber capabilities.

Space-based Intelligence, Surveillance and Reconnaissance (ISR)

Enabling industry and cross-sector applications

Government's significant investment in Defence capability not only supports the ADF's strategic objectives but also supports a significant number of jobs and businesses throughout the supply chain. This investment also facilitates capability development that allows for diversification into adjacent sectors. As the

department responsible for industry policy, the department supports Defence investment that creates opportunities for firms to pivot into civil sectors or export supply chains, and for civilian technology to be used across military applications. There are high-value opportunities for firms across sectors, and defence investment is another mechanism for local firms to build capabilities and increase their participation across supply chains.

The department supports this by identifying and supporting opportunities through Defence that allow for cross-sector applications, including how capability and knowledge can be transferred across sectors. Defence supply chains assist firms in pivoting into civil and export markets, while alternatively also providing opportunities for firms engaged in civil supply chains to be brought into Defence supply chains. The department's key objectives is in using Defence investment to maximise opportunities for Australian industry, particularly where high-skilled jobs can be created, intellectual property can be developed and capability can be exported and contribute to stronger supply chains.

The defence industry plays a pivotal role in facilitating the development and commercialisation of advanced technologies with cross-sector applications. Shared capability requirements such as automation, robotics, and advanced manufacturing lead to strong connections with other industry sectors. Innovation in the defence sector will also enable firms to pivot into civil sectors and will create export opportunities, particularly if a firm has a niche capability.

In addition to this, portfolio agencies also contribute to supporting businesses to pivot from civil uses to military applications. For example, Geoscience Australia is a member of the Defence Geospatial Enterprise Board (DGEB). Within this forum, GA establishes projects with Defence on civilian/defence technology collaboration related to space and spatial technologies.

Support to industry for capability building

Capability development is a strong focus across the portfolio, especially in response to challenges posed by COVID-19. For example, the Australian Institute of Marine Science (AIMS) relies on a range of marine surveillance technologies. COVID-19 has disrupted AIMS' supply chain and as a result the agency has shifted focus towards Australian manufacturing capabilities to support our marine technology needs into the future.

Marine technology capabilities have strong parallels with Defence, and AIMS is working towards building smaller, autonomous platforms with next-generation sensors at scale, combined with artificially intelligent on-board data analysis. AIMS is working to build a national marine autonomous systems technology sector in Australia, capable of delivering national capability in Northern Australia. As part of this initiative, AIMS is working with Australian regulators, Australian Maritime Safety Authority (AMSA), alongside Defence to streamline the assurance and certification of autonomous platforms, essential for Australian manufacturing of these systems.

Similarly, there is scope for AIMS' technology needs to overlap with Defence capabilities. AIMS is well placed to assist with pivoting Defence investment into outputs for use by the marine industry sector. Examples include autonomous systems, surveillance of our oceans, big data management, secure data and interoperable communications, mission control systems, accurate position navigation and timing (including quantum), and next-generation sensing (such as hyperspectral and lidar).

The National Measurement Institute (NMI) contributes to capability building for Defence and Defence suppliers through its services of delivering high-level reference standards to commercial laboratories, and cutting-edge measurement services for use in manufacturing, maintenance and industrial R&D. This ensures reliable measurements are accepted internationally, supporting seamless integration with global supply chains. This is vital for defence procurement, and is critical for instruments and devices needed for critical decisions and operations, including advanced manufacturing, and to meet military

specifications. Further to this, NMI's ability to support industry in implementing the measurements defined in documentary and other standards enables sovereign manufacturing capabilities, and new players to pivot to defence manufacturing and supply.

NMI maintains the broad range of scientific capabilities and services needed to keep defence technologies and systems at operational readiness. These include:

- Extensive capabilities for precision dimensional and coordinate measurements, shock and acceleration, laser and optical systems, acoustics and ultra-sound, pressure, temperature and trace moisture.
- Specialising in a wide range of analyses including chemical, biological, environmental, food functionality and nutritional testing. Our expertise includes low level vitamin determination, trace environmental analysis and low-level DNA measurement.

Finally, the department is providing support for the development of defence capabilities through the Cooperative Research Centres (CRC) Program. The CRC Program is a competitive, merit-based grants program that supports industry led collaborations between industry, researchers and the community. Most recently, SMEs such as DefendTex, Gilmour Space Technologies and Clearbox Systems each received \$3 million in Commonwealth grant funding for capability development activities.

Modern Manufacturing Strategy

Australia's [Modern Manufacturing Strategy \(MMS\)](#) is a whole-of-government strategy to help build the competitiveness, scale and resilience of Australian manufacturers. The Strategy is contributing to Australian manufacturing capability, creating jobs for now and future generations. The Strategy recognises the important role manufacturing will play in Australia's economic recovery, and is sending clear signals to Australian industry on the importance of domestic manufacturing.

The centrepiece of the MMS is the \$1.3 billion Modern Manufacturing Initiative (MMI), which is providing competitive grants which help to improve industry capability and competitiveness across six national manufacturing priority (NMP) areas.

- The **Manufacturing Translation Stream** — helps manufacturers translate research and ideas into commercial outcomes, scale-up, and become more competitive and resilient.
- The **Manufacturing Integration Stream** — helps manufacturers to access domestics and international value chains and enter new markets, fostering Australia's reputation as a modern manufacturing leader.
- The **Manufacturing Collaboration Stream** provides funding for very large projects that support business-to-business and business-to-research collaboration, to build economies of scale.

Under the MMS, the Supply Chain Resilience Initiative (SCRI), aims to strengthen Australia's ability to access critical products and inputs, better positioning us to respond to future supply chain disruptions. The SCRI also includes working with industry to further develop our understanding of supply chains for critical products and supply options to address identified vulnerabilities.

Under the MMS, Defence and Space were identified as two of the six NMP areas and road maps have been developed in consultation with industry to set the direction for future growth and expansion of these priority areas. The NMP road maps set out opportunities for government and industry to work together to scale-up manufacturing activities, access global supply chains and grow jobs. The Space and Defence road maps outline the manufacturing growth opportunities for both sectors and identify how Government will work with industry to deliver long-term transformational outcomes for the Australian economy.

Defence National Manufacturing Priority (NMP)

Defence manufacturing represents a key priority for the Government, and investment in this sector will deliver significant opportunities for Australian businesses, including for the broader economy. The [Defence National Manufacturing \(NMP\) road map](#) aligns with, and complements, the Government's existing

strategic Defence and defence industry policies, leveraging existing initiatives such as the Sovereign Industrial Capability Priorities, which are helping to build capability in areas most critical to Australia's needs. Through the road map there is also a concerted effort to develop and ensure enduring Australian Industry Capability.

The Defence road map identifies three broad areas of opportunity and actions for government and industry to lift defence manufacturing capability:

- *Supporting* our Defence Forces: Leveraging significant Government investment in the defence sector and opportunities to manufacture goods to supply the Australian Defence Force (ADF), aligning with priority capabilities.
- *International*: Expanding to new and existing export markets with strategic partners (subject to export regulations) in products, components and capabilities.
- *Cross-sector*: Diversifying to cross-sector applications for both defence spin-off and spin-in in products, components and capabilities – including with the space sector.

The opportunities identified in the defence road map can assist in building local manufacturers' capabilities so they can better supply and service the ADF and other markets. Growth in Australia's defence manufacturing capabilities will also have spill-over benefits for the broader economy and will lead to increased capability for other National Manufacturing Priorities, and vice versa. These opportunities for diversification include:

- Space domain awareness: Designing, developing, and sustaining integrated sensor networks for persistent surveillance of space objects and phenomena that can be certified and operated as part of a global network shared with our international partners.
- Space-based surveillance technologies: Designing, developing, and sustaining integrated orbital sensor networks for Earth observation, that can be certified and operated as part of a global network shared with our international partners.
- Space-enabled Earth observation technologies: To support more efficient emergency response systems and weather monitoring (for example, GPS and satellite systems to monitor weather and climate, detect environmental disasters, and assist in crop management, urban or environmental planning).

Similarly, the [Space National Manufacturing Priority \(NMP\)](#) road map identifies attracting 'spin-in' opportunities from adjacent sectors (including defence), as a key action for the space sector.

Space National Manufacturing Priority (NMP)

Space is a relatively new sector in Australia, and Government and industry investment in this sector is critical. As the sector matures, critical areas of Australian capability will become clear, and more areas of competitive advantage will emerge. However, Australia's space sector is growing rapidly, and Australian manufacturing capability will play a crucial role in enabling that growth.

The Space NMP road map sets out a vision for government and industry to support a globally recognised Australian space sector, and identifies three key growth opportunities: These are:

- Manufacturing products that are launched into space;
- Manufacturing space components; and
- Manufacturing and production of associated products and infrastructure.

The road map aims to inform investment decisions Government and industry can make across the next 10 years to support projects that will; harness and grow the sectors strengths and advantages, provide innovative solutions to overcome constraints that limit value creation, and transform the space manufacturing sector by facilitating the growth of a capable and sustainable industry.

Demonstrating this, on 6 July 2021, Minister Porter announced nearly \$14 million in grant funding for four Space sector recipients under Round One of the MMI Translation and Integration streams. The Space NMP recipients under the initiative include:

- EffusionTech (NT) who will use its \$1.2 million in funding to develop and manufacture low cost, durable and high performance liquid fuelled rocket engines for the growing commercial launch market.
- Titomic (VIC) who will use its \$2.3 million in funding to commercialise the manufacture of space vehicle and satellite parts using green titanium for Australia's growing space sector and for overseas export.
- Q-CTRL (NSW) who will use its \$4.5 million in funding to expand the manufacture of novel remote sensing payloads for space deployment.
- Romar Engineering (NSW) who will use its \$5.8 million in funding to manufacture and deploy space fluid and motion control products for future space missions.

These project represent the critical role that domestic manufacturing will play in advancing the Space sector over the next ten years to build Australian capability and meet future needs.

Support for Australia's Space Industry

The portfolio supports the growth of the space industry and the development of relevant space capabilities that are closely linked to opportunities for defence capabilities through cross-sector applications. Through the work of the Australian Space Agency, the portfolio has provided a range of grants to industry some of which include:

- **Australian Space Agency's Moon to Mars Supply Chain Facilitation program** – which provides Australian businesses with grant funding to build capacity to deliver products and services into domestic and/or international space industry supply chains. It also complements the Defence Global Supply Chain (GSC) Program. Uplifting these kinds of capabilities in Australia improves the ability for the sector to support future Defence needs.
- **International Space Investment Initiative Expand Capability Grant program** – which has supported 10 Australian organisations to become involved with international space agencies or established international space programs. A majority of the funded projects have some cross-over potential across civil and military space applications.
- **Space Infrastructure Fund** - delivering six space infrastructure investments that will support Australian SMEs to build capability in the space sector. This includes providing grants to academia and SMEs for activities such as upgrade infrastructure, establishing a robotics, automation and artificial intelligence (AI) command and control centre to allow SMEs and researchers control over autonomous space operations and establishing space manufacturing facilities and support delivery of future space manufacturing capabilities.

Advancing Space: Australian Civil Space Strategy 2019-2028

Advancing Space: Australian Civil Space Strategy 2019-2028 is the Australian Government's vision to grow Australia's civil space sector. It sets out a path to triple the size of the sector from \$4 billion to \$12 billion, and to add 20,000 new jobs by 2030. The Civil Space Strategy (the Strategy) sets out seven Australian Civil Space Priority Areas. These are Earth Observation (EO), Space Situational Awareness (SSA) and debris monitoring, Position Navigation and Timing (PNT), Communications technologies and services, Leapfrog R&D, Robotics and Automation on Earth and in Space, and Access to Space.

Technologies, capabilities, and workforce developed across the civil space domain in Australia have the potential to support the development of aligned Defence capabilities. Many of the technologies being developed for space are dual use, and have both civilian and defence applications, including space-based ISR. For example, EO capabilities that are critical for civilian life in Australia, such as weather forecasting or natural disaster management, also have application in a defence context. Likewise, SSA systems that are developed can support Defence Space Domain Awareness and can assist civilian space traffic management.

The development of the civil space workforce and skills can directly contribute to Defence's needs for a space-capable workforce. The Strategy identifies that the Australian Space Agency will create the conditions to grow the future space workforce, including ensuring the workforce is equipped with the necessary skills, inspiring the next generation to pursue careers in space and encouraging STEM education and skills development through the prism of space. In the third phase (2021-2028) of the Strategy, the Australian Space Agency will investigate training priorities for the space sector and develop a future workforce plan, as set out in the Inspire pillar of the Strategy.

The Australian Space Agency has supported a Space Industry Skills Gap Analysis project through SmartSat CRC and is collaborating with the CRC on the second phase of this work. Identifying and addressing opportunities to develop beneficial skills will support the growth of a space workforce able to pivot between civil and Defence needs. The Australian Space Agency is also closely connected to other skills initiatives across Government that will underpin jobs in the space sector, such as Women in STEM initiatives and programs to grow skills in digital, AI and cyber.

Defence and space-based ISR Initiatives

Defence space-based ISR is supported directly by two of the Australian Space Agency's National Civil Space Priority Areas (EO and SSA), and indirectly by the remaining five (Communications Technologies and Services, Position Navigation and Timing, Access to Space, Leapfrog R&D, and to a lesser extent Robotics and Automation).

The Australian Space Agency works closely with Defence to create opportunities and identify pathways to grow Australian space industry capability. Most recently as the Australian Space Agency develops technology roadmaps for National Civil Space Priority Areas; assist development of the Australian Space Industry to enable it to support future Defence ISR projects; and build national resilience in delivering increasingly critical space-based services and infrastructure. Defence is providing input and close support to the Agency, as it develops the seven technology roadmaps aligned with the Civil Space Priority Areas. Geoscience Australia is also supporting the Australian Space Agency as it leads development of a national Earth Observations from Space Technology Roadmap. The EO Roadmap is expected to be published before the end of 2021, and is being developed with support from staff from Defence to ensure alignment with Defence's existing EO and ISR projects.

Collaboration between the Australian Space Agency and Defence on the SSA roadmap will ensure alignment with Defence's Space Domain Awareness (SDA) program, noting that SDA is a broader concept than SSA. The Australian Space Agency is also contributing to Defence programs and projects, including space-based ISR, to maximise use of Australian Space industry and Australian technology. Defence has identified foundation geospatial (EO) information needs and, in collaboration with the Australian Space Agency, is looking to Australian industry to meet some of those needs.

The Australian Space Agency has supported the tender process associated with the Defence Science and Technology Group's Science, Technology and Research (STaR) Shot program. The Resilient Multi-Mission Space STaR Shot will support a broad range of Defence space needs, including space-based ISR. The Australian Space Agency attends the Defence Geospatial Intelligence (GEOINT) Enterprise Board to ensure connectedness to Defence satellite imagery capability developments and uses.

Additionally, the Australian Space Agency is working with the Defence to assist with directing their \$50m commitment to developing SATCOM industry capability, including research and innovation in satellite communication technologies for future consideration (see [media announcement](#)). This will positively impact industry that supports all Defence space needs, including ISR.

AIMS is in early discussions with the Australian Space Agency regarding the potential for cooperation on space-based intelligence and surveillance, which AIMS is well positioned to support. AIMS also has the

at-sea infrastructure, technology and ships to collect the routine ground-truthing data needed to calibrate Australian space-based sensors.

Cyberspace Warfare

Cyber Capabilities Initiatives

Through [Australia's 2020 Cyber Security Strategy](#), as well as the [International Cyber and Critical Tech Engagement Strategy](#), the department is responsible for digital technologies and cyber security industry development, including the development of cyber skills and assisting to lift business cyber literacy. A key initiative under the Cyber Security Strategy is the Cyber Security Skills Partnership Innovation Fund (part of the National Workforce Growth Strategy). The fund provides grants for academic and industry partners to develop innovative and new ways to quickly increase the amount and quality of cyber security professionals available in Australia.

In addition the department is also responsible for the developing industry capability to support emerging and critical technology industry development. We recognise that these technologies such as Artificial Intelligence (AI), have dual purposes across economic and defence settings. It is for this reason the department has championed Australia's AI Ethics Principles, as well as launched Australia's first national AI Action Plan, to ensure the development of AI is completed in way which is secure and fosters responsible uses of the technology.

Defence Estate in North and Northwestern Australia

AIMS has been working with the regional community sector to remain engaged with the Singapore Training Initiative near Townsville, marine Defence-related upgrades at Townsville Port and in Cairns, and also with the Royal Australian Navy to assist in the delivery of their strategy for tropical marine Australia. Based in Townsville, North Queensland, AIMS also has significant research facilities located in Darwin and Perth. These facilities, including its world-class research aquarium (the National Sea Simulator) and two ocean-going research vessels allow AIMS to conduct innovative scientific and technological research to support sustainable growth in the use, environmental management and protection of Australia's tropical marine estate.

AIMS is also embracing a rapid development, iterative lifecycle for its solutions, and is relying on Australian industry to assist. Guidance, navigation and control, and artificial intelligence, are two examples where AIMS is investing in Australian industry for the purpose of enhancing our developed in-field monitoring solutions at scale.