



Space Industry Innovation Council

Government Alignment In Space Policy and Services

Working Group Report

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History of Involvement by Governments in the Space Sector

Governments are significant influencers of space sector¹ developments, while the public sector remains an important user and funder of the space sector globally. This trend is bound to continue as it is well demonstrated that just like the previous “enabling wave” of ICT, space-enabled capability already benefits the life of the everyday citizen. The forthcoming move from Space 1.0 to Space 2.0 has the capacity to unleash a significant new wave of applications, which will further revolutionise the way in which services from space are delivered. This section of the Space Industry Innovation Council’s advice is therefore concerned with the public sector perspective, and draws many parallels from the United Kingdom (UK) Space Innovation and Growth Team’s recent report [Ref UK SIGS].

Governments have been major drivers of the space sector since the early days of the space age in the 1950s. This began with the space race between the United States (US) and the former Soviet Union, while 60 years later the current major powers continue to dominate the sector. It seems to fall to Governments to take the big steps that require vision and deep pockets – the NASA moon landings, the Space Shuttle, the International Space Station etc. Yet those first steps in manned space travel, which had their origins in both national pride and the cold war arms race, have now spawned an international space industry that turns over US\$250 billion annually. It began with large defence and NASA contracts to US firms and technology knowledge was transferred to industry. During the next few decades, more and more work passed to private industry^{2,3}, while the three workhorse space-based segments of Communications, Earth Observation, and Position, Navigation and Timing emerged. Over time, indirect applications that are known as the downstream industry developed out of the space-borne upstream assets, and there is ample evidence in both European and North American economies that investment in the upstream can generate downstream application revenues with a multiplier effect of 5 or 6 to 1. This is a compelling statistic for Governments contemplating how to stimulate and grow a local space industry.

Current Australian Government Involvement in Space

The primary value of the space sector to the public sector (as it is to the private sector) is in space-derived data for applications and services. Space applications and technology can provide the necessary data and evidence for informed decision making. Of course, our concern with space necessarily includes the space-based infrastructure needed to create and deliver this data, whether coming from off-shore or indigenous operators.

¹ Somewhat paradoxically, the terms “space industry” and “space sector” seem to conjure up visions of rocket launches and astronaut travel, but it is less well known how ubiquitous space capability is in areas such as high definition TV, weather forecasting, and smart metering).

² It should be noted that the US Government is now so comfortable with private sector involvement in space that in future it will ferry astronauts and equipment to the ISS using outsourced shuttle services, in order to free up NASA to work on longer term strategic challenges (eg. sustainable travel to Mars) (Ref BBC News).

³ And over time, private sector companies evolved from being suppliers to Government, branching out with the capabilities established through major Government contracts to becoming service providers in their own right.

The UK Space and Innovation Growth Strategy⁴ has abundantly demonstrated how space data and services are now ubiquitous/embedded in the following areas of public policy delivery:

- Providing information and access to services (*use of ICT and space allow more efficient communications networks, providing higher speed of response, information capability and coverage*);
- Safe and efficient movement of people and goods (*use of space enables accurate positioning and navigation to decrease cost and time*);
- Supporting employment and wealth (*services provided from space can provide or enable systems that are essential for a knowledge-based economy*);
- Protecting Citizens (*use of space data facilitates the prediction of, and response to, national emergency and hostile actions*); and
- Securing food, water and energy supplies (*satellite based electro optics, navigation and communications support effective supply management*).

Australia shares these interests, and it is possible to list at least eight key areas of space-derived data and services in which Australia is already participating, along with some medium term aims in which public sector involvement might grow:

- Communications: *The National Broadband Network (NBN) initiative objective includes wholesale Ka-band satellite service (ensuring 12Mbps) to 3 percent of Australian premises to be implemented over the next 8 years. Fibre will be used on 93 percent of premises for 100Mbps, while fixed-wireless service will deliver at least 12Mbps to another 4 percent of premises.*
- Transport: *a Satellite-Based Augmentation System (SBAS) to include the wider application and use of satellite technology in Air Traffic Management, such as Global Navigation Satellite Systems (GNSS) and Automatic Dependent Surveillance Broadcast (ADS-B). This technology is potentially usable by all transport modes and by a number of industries.*
- Security and Defence: *Requirement for space based surveillance systems including intelligence collection satellites, and space capability assurance against counter-space threats, ballistic missile defence and counter WMD capabilities is included in the 2009 Defence White Paper.*
- Weather and Warnings: *Earth Observations from Space (EOS) have been instrumental in improving the accuracy and lead time of weather forecasts, which deliver economic advantage to many government and industry sectors, as well as contributing to the safety of life and property through early warning of severe weather events.*
- Ageing Society and Health: *The E-Health initiative will provide improvements in the way health information is collected, communicated and managed.*
- Water and Food – Sustainability: *Space-based monitoring of land-use, vegetation, pasture growth and water resources, through the use of satellite imagery and*

⁴ A UK Space Innovation and Growth Strategy 2010 to 2030, Space IGS, http://www.spaceigs.co.uk/documents/index/index/cPath/14_24/

mapping capabilities, allows for more comprehensive data-sets to be available for the planning and evaluation of agricultural activity.

- *Media and Entertainment: Developments in satellite communication are improving the reach, speed, quality and availability of channels for free to air and paid television.*
- *Energy and Environment: Through smart metering and climate change monitoring. Australia, through the \$273 million International Forest Carbon Initiative is working internationally to foster agreement on global deforestation and forest degradation and develop a global carbon monitoring system. A carbon forest monitoring uses both satellite data and on-ground forest measurements. These are combined with carbon accounts.*

The Government interest in “space” is in the totality of the upstream infrastructure and downstream applications, given their wealth generation for the economy, and their usefulness in support of policy creation and policy delivery. We stress that not all the cost of service delivery must be borne by Government, but Government support for particular policy responses is influential in persuading industry to invest to achieve a commercial return.

A recent report by the Department of Innovation, Industry, Science and Research (DIISR) has found that approximately \$962 million⁵ is spent annually by the Australian Government alone on space services, with the vast majority of this being national defence projects. Sizeable contributions come also from the Environment and Water portfolio (Bureau of Meteorology) and Resources, Energy and Tourism (Geoscience Australia). Yet the value of the involvement is of course much more – eg. our free access to GPS, US surveillance data. Notwithstanding these contributions, as far as the overall economy is concerned, Australia is punching under its weight, having depended over the years on the short term expedient of purchasing services from other nations and international companies, ranging from all earth observation capability to satellite communications for Defence. In addition, our Government purchasing is not coordinated, and there is even anecdotal evidence that some space data sets are purchased twice or more by different arms of government. These factors have meant that the space activity that exists in Australia remains fragmented, and is not strong enough to compete for the large global contracts that characterise a mature space industry.

A future space policy environment which encourages a level of indigenous capability necessary to spawn the downstream services actually need not be expensive – as the UK has shown, industry will step up if Government is prepared to provide anchor tenancies to underpin business cases, eg. the SkyNet5 communications satellites which was run as a Private Finance Initiative (PFI), and for which the initial investment was raised from private investors in the City of London.⁶

Country Comparison: An analysis of the development of the Canadian space sector over a period of two decades following conscious policy decision of the Canadian Government has yielded a space economy in that country now worth over \$2.8 billion with domestic and export revenues

⁵ Space Systems Analysis May 2010, Space Policy Unit

⁶ A UK Space Innovation and Growth Strategy 2010 to 2030, Space IGS, Page 7 and 22, http://www.spaceigs.co.uk/documents/index/index/cPath/14_24/

representing 50 percent and 50 percent of total revenues respectively.⁷ As a result of strong action by its Government beginning with the establishment of the Canadian Space Agency in 1989, Canada is now a valued Associate Member of the European Space Agency, for the added international prestige and lucrative access to European contracts for its satellite firms that such industrial strength brings.

Characterising the Various Roles of Government in Space Derived Data and Services

From the above discussion, three major roles for the Australian Government in the space sector going forward are clear:

- Space Policy Creation and Monitoring (including well informed regulation)
- Space Data and Services Delivery to implement Australian public policy
- Government procurement as an instrument to stimulate space sector development

A significant collateral benefit of more structured and better mandated Government prosecution of its three key roles will be increased international influence. A report prepared for DIISR on the International Space Landscape⁸ provides ample evidence of how Australia could readily increase its international influence from some judiciously chosen investments in upstream space infrastructure to put itself back on the global map as a serious player in the space sector.

The three roles and the collateral benefit will now be discussed in turn.

Government as a Policy Maker

Policy being the traditional role of Government, Australia is well overdue for the announcement of a space policy that actually has teeth. It is generally recognised that since 2003 when the Government released the *“Australian Government space engagement: policy framework and overview”*, which stated that Australia had no requirement for a coordinating Government space agency or program, and that space industry and research support was available through existing generic competitive programs, there had been little consideration of the changing nature of the sector until recently. Recent action by the UK Government to steer its space policy through a range of bold measures towards growing that country’s industry from 6 percent to 10 percent of the world space market represents recognition that space technology provides the necessary infrastructure to enact and then monitor a wide range of government policies effectively. While Australia is much smaller and less mature than the UK in space matters, and we do not have the competitive force of rival EU countries having leveraged their Government/industry partnerships to great effect, there are nonetheless many parallels that Australia can learn from in the UK experience. The UK SIGS refers to the creation of a ‘Regional Development Agency (RDA) partnership to specifically promote uptake of emerging space technologies in close-to-market end-user applications. Academic-to-industry links and technology transfer should be achieved through existing or new partnerships in a joined-up

⁷ Canadian Space Agency Website: http://www.asc-csa.gc.ca/pdf/space_espace_eng.pdf

⁸ Symbios Communications, A Review of the International Space Landscape: Final Report, 18 May 2010

regional centre⁹. It is clear that the Australian Space Research Program is already helping to promote development within the space sector. However, more encouragement and coordination through Government could assist with these successful applicants becoming nationally/globally successful.

In July 2008, the Senate Committee on Economics held an inquiry into the state of the Australian space science and industry. In November 2008, the Senate Committee issued its report *Lost in Space? Setting a new direction for Australia's space science and industry sector* which outlined six recommendations aimed at Australia regaining an important place in global space science and industry, including the establishment of a government unit to coordinate Australia's civil space engagement and support critical areas of research. Also at this time, Dr Terry Cutler identified in his review of the national innovation system¹⁰ that space and astronomy are natural areas for Australia to specialise in.

Australia has taken the first steps towards this goal, with the creation of the Space Policy Unit within DIISR, establishment of the Australian Space Research Program (ASRP), and the recent creation of the Space Industry Innovation Council (the Space Council). The Prime Minister has also requested the development of a National Space Policy for Australia, to enhance coordination, understanding, and set a strategic direction on Australia's uses and approach to space. For the first time, international players in the industry now have a clear focal point to liaise with, as do the many smaller but in many cases very innovative players in our local market. The time is ripe and the opportunity there for Government to recognise the pervasive nature of space-enabled technology and data in numerous aspects of everyday Australian life, and to articulate policy objectives and associated programs that will enable Australia to benefit in both commercial and public policy terms from the ever-advancing expansion of this US\$250 billion global industry once both upstream and downstream applications are considered. Mechanisms to stimulate the establishment of a solid industrial space sector focussed on key areas, along with its associated skills base, will be crucial to underpinning a policy.

Given the embedded nature of so many space-based products and application that are critical to our society, Government also has a policy delivery role to ensure equitable coverage and access, high levels of service continuity, contingency arrangements for safety and security-critical applications, and the security of access and data from blocking and corruption. Regulatory and policy support to assure associated spectrum and orbital slots into the future is a further important obligation.

Attention does need to be given to creating effective government structures, and close interaction between government at a national, regional and local level is essential. For example, the establishment of the British National Space Centre (BNSC) in the UK held much promise, but is universally seen to have fallen short. In effect, it was a creation which had probably developed the right national plan, however lacked an effective mandate to implement. Individual departments were left free to take space-related decisions, including procurements, according to their individual

⁹ www.spaceigs.co.uk/documents/index/download/fileid/16/filename/space_igs_exec_summary_and_recom.pdf page 49.

¹⁰ *Venturous Australia – Building Strength in Innovation: A Review of the National Innovation System*, Terry Cutler, August 2008.

priorities. Its senior advisory body had also seen that it was a toothless tiger, and over time the key players' interest seems to have waned.

Australia must avoid these pitfalls in whatever structures it establishes in conjunction with a new national space policy. A further question is whether policy and delivery arms should be separated. A true national space agency would have both policy and delivery objectives, but this would be too great a leap from Australia's current immature state to move directly to establishment of an agency as recommended by the Senate Committee. However, it is certainly true that even if the successor to the Space Policy Unit is only responsible for space policy functions, with another body responsible to delivery activity, attention should be given to growing the space industry experience and expertise of the Space Policy Unit's staffing.

In order to reduce the duplication of effort we would see a Policy and Regulatory Organisation that would seek to:

1. Maximize the use of existing data already paid for within the public sector;
2. Create opportunity to develop common user requirements;
3. Allow the identification of business benefits across a range of organizations both public and private that may lead to joint funding opportunities;
4. Through a shared understanding of requirements, allow research and research funding to be more effectively targeted to meet and enable public policy delivery; and
5. Create a forum where industry and the public sector can exchange knowledge outside of the customer-client relationship.

The Council recommends the establishment of a framework for such forums to maximize the benefits that can be achieved through limited funding. An example of a move to reduce duplication in government is the development of the OGRE Panel. Geoscience Australia and the Defence Imagery and Geospatial Organisation (DIGO) have established a cooperatives procurement panel called Optical, Geospatial, Radar and Elevation data and services Panel – OGRE. This panel hopes to improve government engagement with commercial satellite providers and will reduce duplication of satellite data purchases across Government, both at the Commonwealth and state and territory levels.

The primary purpose of the national space policy is to effect strong coordination across Government, and above all to set the direction of Australia's national interests in space. This will involve, understanding how to secure those national interests, whether by establishing capability or providing seed funding to facilitate sector self sufficiency. However, it will not be a vehicle for providing direct industry subsidies, and Government will be looking to cooperate closely with industry to create the environment where an appropriate element of upstream space infrastructure can be acquired with a suitable ROI, and healthy downstream applications will thrive.

Government Involvement in Delivery of Space Data and Services

Once Government has created an appropriate space policy environment, a response to its policy requirements will depend on three elements: space-based user solutions/applications,

infrastructure and implementation. The section *Mandating and Benefiting from a Common Approach* below describes how Government portfolios are starting to see the benefits of working together to move public sector applications for users to a more common family of applications. A good example of this is the OGRE panel as outlined above.

Regarding infrastructure, the Australian Government has thus far chosen not to own and control space-based assets and services, focussing instead from a user perspective on availability, accessibility and assuredness. This is a perfectly appropriate *modus operandi* for users provided the risk levels have been assessed holistically rather than data service by data service, and if likely future as well as present needs are considered at the time of contract. But going forward it may not be enough to simply purchase capability and data from third parties, and Australia does need to start thinking about launching some critical payloads of its own to begin exerting more influence on the global development of the space sector. Such a review may even indicate that Australia needs to own and operate certain critical space assets to have a measure of autonomous capability in times of international unrest. The Space Council and the Space Policy Unit have both made submissions into the National Broadband Network Inquiry, signalling the importance of Earth Observation capabilities to Australian Government programs.

Australia is in fact one of the world's most sophisticated users of Earth Observation (EOS), Navigation and Communications data from space sources, and yet we are uniquely vulnerable. For example, use of EOS data achieves excellent outcomes in land, water and disaster management, but the Australian EOS community relies heavily on international providers for all these data. Whilst in some cases these facilities are fully operational and there is a low probability of failure, there can be many instances of significant risks which are often outside of Australia's control¹¹. Australian agencies depend on space capabilities, including satellites, sensors and ground stations, which may fail, be discontinued or simply become unavailable¹².

Analysis is also required to identify those space-derived services that are essential for national security, so that decisions can be made on the degree of government ownership/control that is required.

ACIL Tasman has estimated that the economic impact of Earth Observations from space to the Australian economy in 2008-09 was at least \$3.3 billion¹³. There are at least ninety two Australian Government programs, totalling \$1.3 billion in annual expenditure, dependent on EOS, including key activities such as the National Carbon Accounting System, National Weather Forecasting Services and reporting obligations under the UN Framework Convention on Climate Change¹⁴. These programs have a medium to high dependency on EOS data, demonstrating Australia's heavy reliance on space-based data and highlighting our vulnerability¹⁵. These programs are primarily concerned with environmental issues, natural resource management, water, agriculture, meteorology, forestry, emergency management, mapping and planning. Approximately half of these programs have a high

¹¹ The Status of Public-Good Remote Sensing in Australia, Geoscience Australia, 2006.

¹² An Australian Strategic Plan for Earth Observations from Space, ATSE 2009, pg. 25.

¹³ ACIL Tasman Report, The economic value of earth observation from space; A review of the value to Australia of Earth observation from Space; September 2010, pg vii.

¹⁴ ACIL Tasman Report, The economic value of earth observation from space; A review of the value to Australia of Earth observation from Space; September 2010, pg 11.

¹⁵ A National Space Policy: Views from the Earth Observation Community, Geoscience Australia, 2010.

dependency on EOS data. However, while these programs are quite diverse there is considerable overlap in the technology and data.

A large proportion of the Earth Observations from space utilised in the delivery of government services are provided via full and open access arrangements, at no direct charge. However, there are hidden costs associated with this supposed 'free' data, not least being the need to invest in maintaining strong and collaborative international relationships, and to contribute quid pro quo through ground station operation and contribution of scientific and technical expertise in, for example, data processing, algorithm development, value-adding and calibration/validation activities. Australia benefits substantially as a result but there are risks in not appreciating the need for continued commitment.

It is the view of the Space Council that this level of exposure to third party delivery of EOS data needs to be recognised and reassessed by Government.

Government Procurement

The Australian Government invests in a range of space activities including satellite communications, human capital (being policy, governance, liaison, regulatory and diplomatic functions), space science and technology research, earth observations from space, satellite broadcast (mainly of television services), and global navigation satellite system usage. The principal purposes of government space activity are: national security, national and international telecommunications and broadcasting, international development assistance, environmental monitoring, and space scientific and industrial research and development.

On both past trend and from overseas experience, the government procurement figure will continue to grow. For example, there are predictions that navigation applications/solutions are likely to mushroom once Galileo and the Indian Regional Navigational Satellite System (IRNSS) GPS-like navigation constellations become available, and it is interesting to note that Australia will be the only continent able to view all 6 space-based navigation systems simultaneously (Global and Regional Navigation Satellite Systems (GNSS and RNSS) operated by: US, Russia, EU, China, Japan and India). Yet these Government procurements and activities are currently managed by 16 different portfolios, and multiple different agencies. As a result, contracts are smaller than they might be. Any opportunity for an industrial company to invest to provide space-based capacity which could not only service the Government need but provide capacity that could be 'on-sold' to other local players or internationally is muted or non-existent. This sovereign control (while exporting excess capacity) satellite model is well proven in the satellite communications area (high definition TV, and voice and data services) and is becoming a strong possibility for aggregated Earth Observation services.

We are not advocating that Government needs to specify a space-based solution for all contracts, because while space infrastructure is a proven enabler of ICT services, it is of course not the only one. But depending on how a service is funded, it is pervasive (whole continent coverage), and is significantly more carbon neutral than terrestrial infrastructure. A stable and suitable regulatory regime needs to be established so that Space solutions can compete with other industries and technologies. The Council recommends that Government ensure that its specifications are functional and not technology-specific. It would be enough to ensure that the policy requirement is technology neutral, leaving market forces and the maturity of competing technologies to sink or

swim on their respective business cases. Space-enabled solutions will then be able to demonstrate their cost effectiveness in many cases.

The Space Council supports the development of Australian space capability. Australia needs to increase over time its own investment in space infrastructure. This would build on the natural advantage of our geographical location, as Australia is a highly attractive location for satellite ground receiving stations in the southern hemisphere. The development of a National Broadband Network (NBN) with increases in bandwidth and availability of the NBN network will be important in helping Australia make the best use of the space data to which we have access.

NBN Co has announced that 3-4 percent of the network will be delivered via a satellite communications infrastructure, covering rural and regional areas where fibre or wireless would be prohibitively expensive. The Space Council endorses this approach.

However, the Space Council considers there is likely to be scope for the NBN space capability to grow commercially beyond the 3-4 percent population coverage currently envisaged. A recent report for the UK Government offers the view that up to 20 percent of the UK population is likely to be satisfied with the speed of satellite broadband services¹⁶ (12Mbps in the NBN case). In the United States several commercial providers in the United States are offering direct satellite broadband to consumers in the United States, including in urban areas and regional “hot spots” where fibre has not yet reached. We are also aware of new technology in near-space communications (35km altitude) for theatre applications over 200km, which has the capability to safely and reliably provide broadband in-fill for regions of low population and therefore the potential to provide an alternative service.

In communications alone, there are now approximately 350 operating satellites in geo-stationary orbit (35,000 km) providing fixed (point to point) and mobile services to aircraft, ships, land vehicles and hand-held terminals. The aviation and maritime industries globally have a critical dependence on this capability. Here in Australia, one of the first users of the Optus D1 satellite was Airservices Australia (formerly the Civil Aviation Authority) which since the 1980s has used transponder capacity on Optus satellites to innovatively “remote” its VHF communications between aircraft pilots and air traffic control in a single hop across the continent. This enabled the much more costly land-based solution for providing full VHF coverage across Australia with land-based assets (which is what is in place in North America) to be avoided. As seen through this local example, a technology-neutral specification had much to recommend it in terms of introducing innovative and cost-effective solutions.

Government should also take note of the defining impact a major government contract can have on the business case and ROI hurdles that companies face in deciding to invest. As can be seen by the Australian produced air traffic management (ATM) system exported from Melbourne, an anchor tenancy provided by the Australian Government in the early 1990s to Airservices Australia was necessary to create the strong export industry that it is today, selling large ATM systems into major Asian markets including China. By analogy, existing global players in the space industry will be

¹⁶ A Space Innovation and Growth Strategy 2010 to 2030, Chapter 3.0, page 37.
http://www.spaceigs.co.uk/documents/index/index/cPath/14_25/.

attracted to transfer technology and know-how into Australia in much the same way if Australia steps up to provide some clear commercial opportunity for developing space assets in support of public policy, lifting smaller existing Australian firms with them into their own global supply chains.

International Influence

A report commissioned by DIISR, *A Review of the International Space Landscape* has quoted ample evidence from a series of personal interviews of senior international players to indicate that Australia is barely visible to the major space nations. With the strong exception of radio-astronomy and niche research areas such as hypersonics, the influence of Australia in space circles has waned significantly in recent decades. Australia is about to be overtaken in space sector capability by smaller and one would think less capable nations such as South Africa and Mexico which have taken the plunge and are investing in space assets to provide a measure of sovereign autonomy as well as an international income stream from the space-based capacity additional to national requirements. It is becoming clearer that the existing policy of purchasing services from other sovereign and commercial sources (in particular the US defence capability) may have been false economy both in terms of the development of a local space industry and in affording Australia any say at all in whether services will always be available, continuous and secure.

Yet these same international managers who are bemoaning Australia's current lack of visibility as a space player, as well as querying the capacity of its spectrum management to support space infrastructure investment in this country, also recall the key role of the deep space network in the 1960s, and express hope that our country's recent tentative steps to re-establish our influence (eg. SPU, Space Research Program, announced SAR Sat acquisition) will be backed by strong and decisive further action in the forthcoming space policy. They point to the many geographical advantages of the Australian continent, its political stability, and known technical skills, as assets that appeal to major players such as the US, European Space Agency (ESA) and Japan Aerospace Exploration Agency (JAXA). It has been suggested that Australia should consider a strategic agreement with ESA for access to and exploitation of the Sentinel series and the associated Global Monitoring for Environmental and Security (GMES) services, similar to the current arrangements in place already with United States agencies¹⁷. These players recognise the growing ambitions and sizeable government expenditures of China, India and Brazil in space capability, yet would in many instances feel more comfortable with direct involvement in a re-invigorated Australian space industry (whether for space-borne or ground based assets on our continent).

From an Australian Government perspective, this delivers a most desirable by-product. Announcement of a forward-looking national space policy backed by enforceable delivery mechanisms, including strong Government/industry partnership opportunities that will over time grow our industrial base, will quite quickly restore to Australia an influential international voice in the space sphere that will add to the armoury assisting our country's growing regional power status that former Prime Minister Rudd was pursuing.

¹⁷ Symbios Communications, *A Review of the International Space Landscape: Final Report*, 18 May 2010, Pg 7.

Trends in Public Policy Relevant to the Future of the Australian Space Sector

According to the UK report “Delivering Public Policy through Space” (2010), there are identified user-related themes relevant to space technology services which appear to be common across its range of Government departments. These include:

- Increasing vulnerability to consequences of failure of space assets that are considered part of a critical national infrastructure
- Security of access to assets (whether as an intelligent customer, or requiring some indigenous capacity)
- Continuity of data is important as well as its quality
- A growing requirement to work within dual role (civil-military) interests
- Some proportion of successful delivery can be attributable to space-enabled data and services, thus underlying infrastructure, which also provides the multiplier potential for export sales of the product
- Increasing demand for ever higher spatial/temporal/spectral resolution may impact the attractiveness of space technology

Discussion at the Space Council has confirmed that most if not all of these themes are also going to be relevant for the procurement of Government services in Australia.

Mandating and Benefiting from a Common Approach

Given the above policy themes and directions, as well as the applications that were given as examples in the seven key areas mentioned above that will be impacted by the themes, it becomes clear that:

- Government investments in space capability are currently sub-critical and procurement is conducted against a narrow set of requirements.
- International influence is reduced and industrial strategy is at best incoherent or at worst non-existent;
- Departments are starting to realise the common challenges they face in securing space-based data, and are increasingly willing to work together for the common good;
- Government would benefit from coordinating and/or aggregating its requirements for space-based solutions across the whole of the public sector for better efficiency as well as opportunity;
- There is scope for improving overall competitiveness from definition of policy goals in a technology-neutral way that gives space-derived data and services their best chance to be selected;
- Any reduction in individual budget, when aggregated, should be more than offset by the power of consolidation, including more effective policy delivery, and direction of industry towards more downstream services.

Australia would do well to set up its national space structures with the above in mind, such that a strategic view can be taken with an identified Government lead in order to optimise investment

choices. This will require an expansion of expertise linking centralised technology skills with distributed policy knowledge and strengthened space awareness in department, adherence wherever possible to the dual use asset approach insofar as defence is concerned, and a closer partnership with the private sector, for sharing of resources and aggregation of government and commercial requirements and solutions.

Experience Elsewhere – What Not to Do and its Corollary

Don't –

- Create a pan-Government coordination body without the teeth it needs to be successful.
- Depend exclusively on other parties for essential space-based data and services
- Allow Government purchasing of space services to proceed in uncoordinated fashion to very narrow requirements

Do –

- Have a strong whole-of-Government policy and delivery coordination with both mandated influence and access to whole-of-government budgets
- Recognise the value that can be extracted from space-based information, especially Earth Observations, in delivering Government services and especially in protecting Australian lives and property
- Re-examine Australia's risk appetite in relation to the level of third party dependence it currently has
- Create structures and incentives for departments to work together on their space-related purchasing
- Have a growth path for the Australian space industry which includes an extended Australian Space Research Program (needed in order for Australian industry to take a long term view) and some judiciously timed and incremented space capability (eg. an Earth Observation payload within the next three years, and a dual-use Synthetic Aperture Radar satellite within eight years)
- Re-examine the potential value of Australian-provided satellite communication capacity the next time a defence or other major communications opportunity presents
- Explore the broader opportunities available from the National Broadband Network (NBN) satellite acquisition.
- Pursue a satellite-based augmentation system (SBAS) for aviation and maritime, including the likely downstream applications in the business case.

Possible Recommendations for Government

1. Act with one voice in space matters. Back up a strong Cabinet-level mandate with clear guidance that whole-of-government views and action must be taken on the implementation of space policy and services.
2. Require Government procurement of assets, data and services that could be provided via space-based solutions to be specified in technology-neutral terms. There remains much opportunity

to leverage the NBN Ka-band satellite purchases for the wider benefit to Australia at commercial return rates than the 3-7 percent of the population that the KPMG/McKinsey report¹⁸ believe need to be serviced via satellite.

3. Move towards consolidating the Government's own purchasing power in relation to space-based capability. Also recognise Government's capacity to boost space industry development via its own spend, which if directed to upstream capability would be expected to generate a 6:1 multiplier effect from associated downstream application services. Be open to assessing business cases from industry that require anchor tenancy, and in some cases an element of up front cash flow to get started.
4. In re-establishing presence and growth into the Australian space sector, do not bite off too much initially. Start small by extending the Australian Space Research Program as a means of assessing niche areas for Australia as well as of building industrial capacity. Specifically examine the space-based opportunities currently on offer, eg. an Australian-controlled Earth Observation payload on an ESA or similar satellite constellation, and the already announced Synthetic Aperture Radar satellites which is in the Defence Capability Plan for 2019, and establish the relevant Australian technological roadmaps.
5. Reassess Australia's risk appetite for the almost total dependence on services purchased from or shared by third parties, including our closest defence allies, and put in place a multi-year action plan to implement the conclusions. *[The Council expects that our international allies too would feel more comfortable if Australia became more self-reliant insofar as space-based capability is concerned.]*
6. Rise to the influential role that Australia aspires to as a middle ranking world power through conscious building up of the local space industry via systematised coordination of government purchasing and policy implementation. Some upstream capability will be required to achieve this.

¹⁸ National Broadband Network Implement Study, KPMG and McKinsey, 2010.