



A P A C

**A REVIEW OF
CURRENT AUSTRALIAN SPACE
ACTIVITIES**

Executive Summary

May 2011

A report to the
Space Policy Unit
Department of Innovation, Industry, Science & Research

Executive Summary

This study identified 631 Australian organisations outside of the Federal Government that are currently conducting space activities in Australia. These current space activities make a major contribution to the Australian economy by employing an estimated 8,418 total staff, 6,039 Full Time Equivalent staff and generating revenues ranging between \$1 billion and \$2.2 billion dollars. 'Space Enabled Services & Applications' (which includes Telecommunications and Broadcasting services, Earth Observation services and Positioning, Navigation and Timing services) is the largest area of current activity with 68% of organisations active in this field. 'Ground Systems', where Australia is well regarded internationally through hosting ground stations for international organisations, 'Space-Related Research & Development' and 'Education & Training' are the next most prominent and significant areas of Australian space activities. This study found that space activities are conducted in every Australian state and territory. The products of these space activities are used by every major industry sector across Australia and constitute an essential part of the modern Australian economy. Space services also form a critical and essential part of Australia's national security, emergency response and disaster management activities and hence their value to the Australian community is significant and extends well beyond the substantial direct economic measures.

Background

This study was initiated by the Space Policy Unit (SPU) of the Department of Innovation, Industry, Science & Research (DIISR) to provide a detailed review of Australia's civil space-related activities and an economic assessment of the current value of space to the Australian community and associated trends. For the purposes of the study "civil space activities" were defined by the SPU as "any space activities not conducted by the Federal Government". Thus, the scope of the study included activities in the space industry, state and local governments, and education and research sectors, but excluded Federal Government activities. The term "current activities" was defined by the SPU as "any activity currently being undertaken" and did not include any future or past activity. Hence the study provides a snapshot of the size and economic impact of Australian space activities currently in progress outside of the Federal Government space activities. A first phase of the study was undertaken in 2010 and the SPU requested APAC to update the 2010 study with a second wave of data collection and analysis in 2011 to build on the success of the initial phase and elicit additional responses particularly in the areas of economic metrics and staff employment.

Objectives

- 1) To identify as many organisations currently conducting space activities as possible within the timeframe; and
- 2) To obtain from these organisations relevant information about their current space activities and related economic information for an assessment of the current value of these activities to the Australian economy.

Methodology

Data was primarily collected through an online survey specifically designed for this study. Overall more than 1,000 survey invitations were distributed to previous respondents, universities, State Governments and companies likely to be involved in current space activities. Over a period of four weeks 346 responses were received. These were reviewed for validity and multiple responses from the same organisation were merged resulting in 232 consolidated responses. The survey data was supplemented with internet research and consultation with individual organisations and major industry figures.

Findings on Organisations Currently Undertaking Space-Related Activities

This study identified 631 organisations conducting current space-related activity in Australia. Based on categories of space activities used in international studies coupled with knowledge of the unique characteristics of Australia’s current domestic space scene, APAC defined the following primary classifications of space activities for this study:

Major categories of space-related activities	Number of Organisations
Space Systems	59
Launch Activities & Support Services	23
Ground Systems	153
Space Enabled Services & Applications	430
Space Activity Support Services	94
Space-Related Research & Development	136
Space Education & Training	111
Space-Related Associations, Media and Public Information Activities	56
Other Space-related Activities	18

The vast majority of the 631 organisations conducting current space-related activities in Australia are in the private sector (74% private sector, 14% education/research sector, 12% State Government/non-profit sector). The diversity and uniqueness of space activities within universities was best captured at the department or faculty level hence university departments involved in space activities were treated as separate organisations in this survey and multiple responses from the same department or faculty were consolidated into a single response.

The number of organisations active in each category is shown in the table above. The results indicate that there is currently significant Australian activity in all of the major space activity categories. Many organisations are active in more than one primary category. For example it is quite common for a broadcaster providing its services over satellites to also have a ground station to facilitate this and most university departments are active in both the Research and Education categories. A total of 1,433 separate activities in 51 subcategories have been identified across the 631 organisations, indicating an average of 2.3 activities per organisation.

The ‘Space Enabled Services & Applications’ category is by far the largest area of Australian space activity. This is consistent with international trends where this category is consistently the most dominant area of activity. This category includes Positioning, Navigation and Timing Services (GPS and GNSS), Earth Observation services such as provision of satellite imagery, and telecommunications and broadcasting services. Over 68% of the 631 organisations are active in this category with a strong representation of activities across all the subcategories in this field.

The ‘Ground Systems’ category is the second most prolific area of space activity in Australia with 24% of organisations currently active in this field. This category includes supply and installation of earth stations, operation of earth stations and teleports and operation of stations for tracking and monitoring of spacecraft. The significant level of activity reflects Australia’s strong heritage in satellite communications and hosting ground stations for international organisations and Australia is well regarded internationally in this area.

‘Space-Related Research & Development’ and ‘Space Education and Training’ are major areas of current Australian space activity. These are dominated by university departments which have indicated a vast array of space-related studies and research endeavours. There are 82 separate university departments that are conducting space-

related research & development. In the 'Education and Training' category a total of 50 space-related undergraduate and 70 graduate programs were identified as currently being offered. In addition to these formal programs 190 individual undergraduate and 85 individual graduate space-related courses were identified. The combined enrolment in these courses exceeds 4,000 students derived from the sum of the students enrolled in each individual course in the program. This number does not equate to the total number of students in these programs because most students would take multiple courses and hence be counted multiple times, however it does indicate a strong interest by university students in space-related courses.

Findings on Economic Contribution of Australia’s Space-Related Activities

The economic value of space to the Australian community has three different but interrelated components, which cannot all be readily quantified:

- 1) Direct economic measures such as the direct revenue generated by space activities and the number of people employed,
- 2) Indirect economic benefit to the second tier of organisations that supply products and services to the main organisations conducting space activities,
- 3) Induced effect upon the broader community where the products, services and impact of space activities ripple out and affect all quarters of the community.

Organisations indicated their space-related revenue by selecting from a pre-set range of revenues (i.e. \$500k-\$1m, \$1m-\$5m, etc.) resulting in a range for total revenue. Revenue information in this form was received from 180 survey respondents revealing a minimum current space activity revenue of at least \$551m with the upper end of the range as high as \$1,203m. Of these 180 respondents 170 indicated staff headcounts of 2,402 and 159 respondents indicated Full-Time Equivalent (FTE) staff of 1,574. The direct economic measures were derived by the extrapolation of total revenue and staff reported by 180 survey respondents across the 631 organisations with current space activities. This yields the following estimates for current Australian space activities:

Estimated Revenue p.a.	Estimated Workforce Headcount	Estimated Workforce FTE
\$1 Billion - \$2.2 Billion	8,418	6,039

Beyond these direct measures of economic value there is an induced effect upon the broader community. Studies in the UK have estimated that there is an employment multiplier of 3.6 for the UK space industry, meaning that for every job directly supported by the space industry another 2.6 in total are supported indirectly in the supply chain and from the induced spending of those directly or indirectly employed by the UK space industry. Applying a similar multiplier to the Australian community would suggest that the employment of around 20,000 Australians is supported directly or indirectly by current Australian space activities.

The same UK studies found that the productivity of workers in the UK space industry was more than two and a half times the figure for the UK economy as a whole due in part to the highly qualified nature of the workforce. This same trait of a highly qualified workforce was identified for Australian space activities and hence it is likely that the staff employed on current Australian space activities similarly have higher average productivity than the Australian economy as a whole.

The study findings indicated that virtually every part of the Australian economy relies on space-related activities in some way. Clients for current space activities were identified in all 22 ANZSIC industry code sectors indicating that the products derived from space activities are used widely across all sectors of economic activity and constitute an essential part of the modern Australian economy. Many of these areas are multibillion

dollar industries and much of their productivity is heavily influenced by the utilisation of space derived data. Hence the economic impact of space activities goes well beyond what can be quantified within the scope of this study. It is also clear that space derived data and communications are an integral part of Australia's national security, emergency response and disaster management requirements and hence their value to the Australian community goes well beyond standard economic measures.

The study also uncovered attributes of staff demographics, particularly age, gender, level of qualification and geographic location around the country. Based on the survey responses 96% of employees involved in Australian space activities are in the 20-50 year age range with 71% of staff between 30-50 years of age. In terms of gender the workforce engaged on current space activities is split 84% male and 16% female. Space industry staff are well educated with 46% of reported staff having post graduate degrees and 79% of staff having at least a bachelor's degree. Analysis of the geographic distribution of staff indicates that staff are engaged in space activities in every Australian state and territory. Based on the direct staff numbers from the survey responses most space activity staff are located in NSW (27%) with Victoria (17.4%), Western Australia (17%) and South Australia (16%) having the next highest concentrations of staff conducting space activities.

Trends and Business Sentiment

Organisations were asked a number of questions relating to economic trends and expectations for their space related activities. In general, the majority of the 154 organisations that responded on the subject of business outlook indicated stability of revenues, exports, imports and employment for their space activities over the last 3 years and they expected this to continue over next three years. However, while the highest number of respondents expected no change, approximately 30-40% expected growth ranging as high as 25-50% and roughly 10-15% expected small declines. The responses indicate a general bias towards stability or positive revenue growth in the next one to three years.

There was a more pronounced expectation of no change with respect to export revenue although there is a strong bias towards growth rather than decline among those organisations that did expect changes in export revenue. More organisations expect growth in overall revenue than growth in export revenue indicating that the majority of respondents that anticipate growth are expecting it to occur in the domestic marketplace.

The outlook for employment on space-related activities is very similar to the responses on financial trends. The predominant response was for no change in employment. Of the organisations that did anticipate changes to staff numbers the majority clearly expected growth in staff numbers rather than decline.

Survey participants were asked if they experienced skill shortages for space-related activities. Out of the 187 organisations that responded to this question 84 reported skills shortages and problems with recruiting staff for space-related activities. Of those encountering these shortages 52 had to recruit staff from overseas to meet these needs indicating an issue that must be addressed for the continuance of space activities in Australia in the future.

Conclusions and Next Steps

This study, initiated in 2010 and updated in 2011, is the first Australian study on space activities in nearly two decades and has uncovered significant data on the state of the Australian space industry. It reveals that Australian space activities are substantial in their own right in terms of the number of organisations involved (631) the number of people employed (8,418) and the revenue generated (\$1 billion - \$2.2 billion). These space activities are produced in every Australian state and territory and are used by all

major industry sectors in Australia. The study also reveals that there is a significant level of space expertise in Australia that is increasingly recognised internationally and represents a strong foundation upon which future activities and participation in domestic and international space projects can be based.

Initial and intermittent studies can rarely capture all the necessary information in a sector as complex as space particularly within a short time-frame and that is certainly the case with this study. Hence the findings of this report must be regarded as a snapshot of preliminary indications requiring more thorough exploration and quantification. Overseas studies have required several years of annual data collection to yield more reliable and valid econometrics and trends. It is strongly recommended that this survey be repeated annually in order to yield more comprehensive and accurate data after learning from this initial study.

The findings of this study indicate the significant size and complexity of Australia's space-related activities. These are a major contributor to Australia's economy, security and skill-base as well as a major employer. Australia has significant strengths in many space activity areas and Australia's universities are educating many highly skilled people. It would serve Australia well to have focussed and co-ordinated Government support and funding to develop and optimise this important industry and retain our brightest minds.