Chapter 3

Looking out

3.1 Australia has built a strong reputation for the work of its astronomers in 'looking out' (or 'listening out') to the distant universe and tracking and communicating with space objects closer to Earth. This aspect of space is predominantly the domain of scientists, with few commercial applications.

3.2 The range of activities, and the enthusiasm for them, was demonstrated to the committee by a CSIRO scientist:

> The looking-up lens is about expanding the frontiers of science. One of those areas is the radio astronomy area…where we are asking some of those fundamental questions: what is the origin of magnetism; are Einstein's laws fully correct; and where is the dark matter coming from? Some of these are going to have the next Nobel prizes in them, and that is fantastic.[1]

Astronomy

"Jupiter and Saturn, Oberon, Miranda and Titania.
Neptune, Titan, stars can frighten"
Pink Floyd, *Astronomy Domine* (Lyrics: S. Barrett)

"A good friend of mine studies the stars,
Venus and Mars are alright tonight"
Wings, *Venus and Mars* (Lyrics: P. McCartney)

"Images of broken light which dance before me like a million eyes
That call me on and on across the universe"
The Beatles, *Across the Universe* (Lyrics: J. Lennon/ P. McCartney)

"You ate our chips, and you drank our Coke
Then you showed me Mars, through your telescope"
Supergrass, *Grace*, (Lyrics: G. Coombes, R. Coombes, D. Goffey, M. Quinn)

3.3 Astronomy is an important part of space science and one in which Australia excels. The appointment of ANU astronomer Professor Penny Sackett as Chief Scientist should ensure astronomy continues to be given due consideration within government.

3.4 One expert witness opined:

> There is no doubt that Australian radio and optical astronomers, along with their facilities, are highly regarded internationally, and in these fields,

1 Dr James Moody, CSIRO, *Proof Committee Hansard*, 29 July 2008, p. 31.

> Australia does have a natural geographic advantage, both in terms of 'wide open spaces' and a privileged view of the galactic centre.[2]

3.5 Australia has a 10 per cent stake (through the Australian National University and Astronomy Australia Ltd) in the Giant Magellan Telescope currently being constructed in the Andes. When completed around 2016 it should produce images up to ten times sharper than the Hubble Space Telescope.

Square Kilometre Array

3.6 The Square Kilometre Array (SKA) is a giant radio telescope designed to do leading edge radioastronomy. The CSIRO is the lead agency in Australia's bid to host the facility. Australia has made the final two in the selection process and the DIISR sounds confident about Australia's prospects:

> …I think we have a very compelling case. We have committed in the last year to hosting a demonstration instrument, which will be a significant instrument in its own right. It was discussed as part of ministerial and prime ministerial visits to Europe recently. I am not sure that there is more that we could do at this stage. [3]

3.7 The DIISR commented:

> …it will be an extremely high-tech instrument that will potentially provide a lot of opportunities for high-tech Australian companies to participate. Our assessment is that, given that the infrastructure is largely sophisticated radio antennas and a range of supercomputing, visualisation and other application software—which are areas where we do have leading-edge capability, particularly in antennas and ground station technology—we think there is quite a good opportunity for Australia to benefit from that project. [4]

3.8 If the Australian bid is successful the telescope will be constructed between 2012 and 2020 at a total cost of $1.8 billion. Around half the array will be located at the core site at the Murchison Radio-Astronomy Observatory, within a 260km radius radio-quiet area around 300 kms north-east of Geraldton, which will be built regardless of the decision on the SKA.[5]

3.9 The Joint Committee on Public Works is to report soon on the project, having held a public hearing in Geraldton about it.

3.10 There is general enthusiasm about the potential of the project and praise for the support governments were showing:

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2 Dr John Boyd, *Submission 82*, p. 4.

3 Dr Michael Green, DIISR, *Committee Hansard*, 16 May 2008, p. 12.

4 Dr Michael Green, DIISR, *Committee Hansard*, 16 May 2008, p. 12.

5 Western Australian Department of Industry and Resources, *Submission 85*, pp 5-6.

> One cannot predict what the SKA might produce, only that it will almost certainly produce fantastic technologies that we have not imagined yet. [6]
>
> I commend government for the effort and the support that has been provided to the SKA project through the Pathfinder investment initially, and I think the Western Australian government is also to be congratulated…SKA, for Western Australia but, indeed, for the entire continent, represents an investment in knowledge which is stunning.[7]
>
> applauding the large investment already being made by the Australian Government in the Australian SKA Pathfinder project as well as the leadership role Australia is taking in the international SKA project and noting the considerable scientific, economic, educational, social and broader national benefit which the SKA project is expected to confer, [the Australian space community] recommend that the Australian Government considers increasing its support for the SKA project, specifically through programmes and processes which encourage and enhance early Australian industry involvement.[8]

3.11 The committee heard some suggestions for worthwhile science that would also bolster the case for the SKA being located in Australia:

> If we have a good understanding or the world-best understanding of the ionosphere and space weather, that would be a good argument for basing it [the SKA] here rather than in South Africa…[9]

Space tracking

"We're space trackin' round the stars
Come on, let's go space trackin'"
Deep Purple, *Space Trucking*, (Lyrics: I. Gillan, R. Blackmore, J. Lord, I. Paice, R. Glover)

Oh man! Wonder if he'll ever know
He's in the best selling show, Is there life on Mars?
David Bowie, *Life on Mars*, (Lyrics: D. Bowie)

3.12 Australia has a distinguished record of involvement in tracking and processing information from spacecraft. The 'big dish' at Parkes had an important role in the Apollo missions in the 1960s. In 2008 the Phoenix Mars Lander has been transmitting data back to Earth using the Deep Space Tracking Station at Tidbinbilla, near Canberra. As noted in the previous chapter, Australia has geographical advantages for this activity.

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6 Mr Brett Biddington, *Proof Committee Hansard*, 29 July 2008, p. 49.

7 Mr Brett Biddington, *Proof Committee Hansard*, 29 July 2008, p. 48.

8 Appendix 4.

9 Professor Iver Cairns, National Committee for Space Science, *Proof Committee Hansard*, 29 July 2008, p. 83.

3.13 CSIRO said of the Tidbinbilla centre:

> That $24 million activity is funded entirely by NASA. That is very high profile and, as you have seen, very busy, and it is mission critical in supporting the $20 billion worth of assets that the international space community—mainly NASA—has for exploring the solar system.[10]

Conclusion

3.14 The committee commends the work of Australian astronomers. Astronomy has had significant support from governments, with the SKA application being successfully developed to the stage where Australia is on the final shortlist of two sites. Astronomers seem to have been successful in applying for 'lumpy' grants for occasional large projects such as the SKA; and the CSIRO and universities have provided recurrent funding. While astronomy would benefit from more government attention to space, it is not the major focus of recommendations in this report.

10 Dr Miriam Baltuck, CSIRO, *Proof Committee Hansard*, 29 July 2008, p. 32.