

## Telecommunications and data services

- 4.1 As discussed in the previous chapter, the Committee heard about a range of emerging technologies with the potential to increase productivity in the agricultural sector.
- 4.2 However, consistent with the terms of reference of this inquiry, the Committee also received evidence about impediments to timely and widespread adoption of technology in the sector.
- 4.3 This chapter discusses barriers to the adoption of emerging technology associated with access to telecommunications infrastructure and the collection and analysis of agricultural data.
- 4.4 Further barriers to innovation in the agricultural sector are discussed in subsequent chapters.

### Role of telecommunications and data

- 4.5 Throughout the inquiry, the Committee was told about the essential role of telecommunications and data in the application of new and emerging agricultural technology and, more generally, in the day-to-day operation of a modern farming business.
- 4.6 Several areas of agricultural technology were identified in evidence as having a critical dependence on reliable access to telecommunications services and/or the capability to collect and analyse large quantities of agricultural data:
  - **Remote control and automation of farm equipment:** Using global positioning systems and wireless connectivity, farm equipment can be operated semi-autonomously and farm activities – such as irrigation,

livestock management, and feed allocation – can be controlled from remote sites.<sup>1</sup>

- **Precision or spatially-enabled agriculture:** The availability of accurate positioning data enables automation of the rate and position of crop inputs, such as seed, pesticide, and fertiliser. Similarly, electronic identification allows animals to be monitored and managed at the individual level.<sup>2</sup>
- **Monitoring and remote sensing:** Networks of compact, cost-effective sensors and probes enable real time monitoring of soil moisture, soil pH, light absorption, water supply, gas emissions, and other agricultural and atmospheric variables. This information can be integrated with high-resolution images and other data collected from satellites and drones.<sup>3</sup>
- **Data services:** Building on the collection of data at the paddock level, agricultural data can be aggregated on an industry or regional scale and combined with external information such as weather or price forecasts.<sup>4</sup>

4.7 The Committee heard how the adoption and integration of these and other technologies has the potential to increase productivity (through better management of inputs and yields), improve environmental outcomes, and enable farmers and consultants to manage risk and make better management decisions (see previous chapter).

4.8 However, the Australian Academy of Technological Sciences and Engineering (ATSE) cautioned that only with reliable access to fit-for-purpose telecommunications services would farmers be able to take advantage of the opportunities presented by emerging technologies.<sup>5</sup>

4.9 Stakeholders also emphasised the importance of particular telecommunications services. For example, Cotton Australia submitted that innovation based on the analysis of agricultural data relies on upload capacity.<sup>6</sup>

1 Dr Lindsay Campbell, University of Sydney, *Submission 31*, pp. 1–2.

2 University of New England, *Submission 11*, pp. 2–3; Vanderfield Pty Ltd, *Submission 79*, pp. 3–7; Australian Farm Institute, *Submission 85*, pp. 3–4.

3 University of New England, *Submission 11*, p. 7; Professor Brian Orr, Macquarie University, *Submission 30*, p. 3; Dr Lindsay Campbell, University of Sydney, *Submission 31*, p. 2; Vanderfield Pty Ltd, *Submission 79*, p. 10; Telstra, *Submission 81*, p. 6.

4 NNNCo Pty Ltd, *Submission 34*, pp. 4–5; CSIRO, *Submission 55*, p. 11; Tasmanian Government, *Submission 58*, pp. 2–3; RIRDC, *Submission 74*, p. 4; Australian Centre for Field Robotics, *Submission 94*, p. 7.

5 Academy of Technological Sciences and Engineering, *Submission 56*, pp. 6–7, 11.

6 Cotton Australia, *Submission 72*, p. 10.

- 4.10 Similarly, the University of New England submitted that the adoption of precision agriculture would be assisted by the availability of centimetre-accurate positioning systems across Australia.<sup>7</sup>
- 4.11 However, the University also emphasised the importance of reliable whole-of-farm communications infrastructure that would enable farmers to connect to high-speed internet from anywhere on the farm:
- Increasingly, farm technology and innovation is reliant on two-way data transfer enabled by reliable mobile phone coverage and concomitant access to high speed internet, not just in the homestead but also in the paddock where sensors and machinery are deployed.<sup>8</sup>
- 4.12 The Committee was also told about the increasing importance of basic telecommunications services in the day-to-day management of a farm, such as accessing information in the field using mobile devices or communicating with financial, veterinary, and agricultural advisory services.<sup>9</sup>
- 4.13 More broadly, the Committee received evidence about how access to telecommunications services is critical to the ability of rural communities and the agricultural sector to develop and retain a skilled workforce.<sup>10</sup> Evidence relating to labour, skills, and training is discussed in further detail in the following chapter.

## Access to telecommunications infrastructure

- 4.14 The Committee notes and applauds Australian farmers' demonstrated ability to adapt to existing innovative technologies. One clear example of this is the adoption of mobile phone or 'smart phone' technology.
- 4.15 Limited access to telecommunications services was frequently cited as being a fundamental barrier to agricultural innovation and the adoption of emerging technology.<sup>11</sup>

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7 University of New England, *Submission 11*, pp. 3–4.

8 University of New England, *Submission 11*, p. 7.

9 NSW Farmers' Association, *Submission 45*, p. 15; Victorian Farmers Federation, *Submission 57*, p. 2; Grain Growers Limited, *Submission 82*, p. 7; South East Premium Wheat Growers' Association, *Submission 83*, p. 2.

10 Victorian Farmers Federation, *Submission 57*, p. 2; Australian Women in Agriculture, *Submission 63*, p. 5; South East Premium Wheat Growers' Association, *Submission 83*, p. 2.

11 For example, see: Alpine Valleys Dairy Pathways Project, *Submission 10*, p. 2; Gwydir Shire Council, *Submission 14*, p. 1; Plant Biosecurity Cooperative Research Centre, *Submission 36*, pp. 7–8; United States Studies Centre, University of Sydney, *Submission 39*, p. 2; Rabobank

- 4.16 The Victorian Farmers Federation submitted that inadequate telecommunications services are currently limiting the uptake of emerging technology and, as a result, limiting the productivity of farm businesses.<sup>12</sup>
- 4.17 Similarly, the NSW Farmers' Association submitted that there is a 'digital divide' facing farm businesses, putting many at a competitive disadvantage. The Association argued that the highest priority in agricultural innovation is improving connectivity to information and communication technology.<sup>13</sup>
- 4.18 The Commonwealth Scientific and Industrial Research Organisation (CSIRO) submitted that a lack of access to high-speed internet would continue to limit the adoption of digital technologies by many Australian farm businesses as telecommunications networks evolve.<sup>14</sup>
- 4.19 However, the Committee also heard that the uptake of digital technologies and the application of 'big data' to farming have been strong within Australia, to the extent that existing infrastructure has allowed.<sup>15</sup>
- 4.20 The NSW Farmers' Association submitted that farmers are motivated to adopt digital technology and engage with the digital economy, although many are 'blocked at the first step'.<sup>16</sup>
- 4.21 The Victorian Farmers Federation identified inadequate bandwidth and intermittent coverage and connectivity as barriers limiting the ability of farm businesses to embrace new technology.<sup>17</sup>
- 4.22 However, a wide range of concerns were raised in evidence in relation to telecommunications, including basic connectivity and coverage, service reliability, upload and download bandwidth, download limits, and the cost of services.
- 4.23 Evidence related to both fixed-line (and fixed-wireless and satellite) internet services and mobile networks, reflecting the variety of ways in which regional and rural communities access the internet.

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Australia, *Submission 48*, p. 5; Tractor and Machinery Association of Australia, *Submission 54*, p. 1; Southern Farming Systems and the Australian Controlled Traffic Farming Association, *Submission 61*, p. 9; Entrevators Pty Ltd, *Submission 62*, p. 2; Australian Women in Agriculture, *Submission 63*, pp. 2-3; Growcom, *Submission 67*, p. 5; Australian Sugar Milling Council, *Submission 68*, p. 2; Australian Pork Limited, *Submission 70*, p. 4; Cotton Australia, *Submission 72*, p. 10; Ag Institute Australia, *Submission 73*, p. 3; Cattle Council of Australia, Sheepmeat Council of Australia, and Australian Lot Feeders Association, *Submission 84*, p. 12; DAWR, *Submission 88*, p. 16.

12 Victorian Farmers Federation, *Submission 57*, p. 1.

13 NSW Farmers' Association, *Submission 45*, p. 15.

14 CSIRO, *Submission 55*, p. 11.

15 Grain Growers Limited, *Submission 82*, p. 6.

16 NSW Farmers' Association, *Submission 45*, p. 18.

17 Victorian Farmers Federation, *Submission 57*, p. 6.

- 4.24 Stakeholders also noted that new technologies strengthen the dependence on reliable cost-effective power supply and emphasised the importance of maintaining a viable electricity market.<sup>18</sup>
- 4.25 Further evidence related to access to telecommunications services is discussed in the remainder of this section as follows:
- internet access and the National Broadband Network;
  - mobile networks; and
  - satellite services.

### **Internet access and the National Broadband Network**

- 4.26 The Committee heard that in many rural and remote areas, fixed-line internet services such as ADSL, which operates over relatively short distances of copper-based telephone line, are unavailable to farm businesses.<sup>19</sup>
- 4.27 Mr Mark Swift illustrated the difficulty of adopting new technology – in this case, multispectral imaging – without access to high-speed internet:
- Large high resolution images are very large data files. In many rural areas the fastest way to transfer these files is via Australia Post ...<sup>20</sup>
- 4.28 Telstra explained the ad-hoc nature of the fixed-line network in rural and remote areas:
- ... large amounts of the fixed line network in regional and rural Australia have been there for a long period of time, and the original network was configured to support voice services. Over time, broadband has been added as a new feature in the network, using copper based services. But there are large parts of regional Australia where in fact their fixed line service is provided via radio concentrator services and the like, which were never envisaged to provide broadband services.<sup>21</sup>
- 4.29 The Committee heard that there were practical and commercial limitations to comprehensive high-speed internet access. However, stakeholders were

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18 ADF-DA, *Submission 65*, p. 7; Cotton Australia, *Submission 72*, pp. 4–5.

19 NSW Farmers' Association, *Submission 45*, p. 13; South East Premium Wheat Growers' Association, *Submission 83*, att. B: 'Regional data access: Connection to our economic future', p. 5.

20 Mr Mark Swift, *Submission 76*, p. 2.

21 Mr James Shaw, Director, Government Relations, Telstra, *Committee Hansard*, Canberra, 11 February 2016, pp. 3–4.

- optimistic that the ongoing rollout of the National Broadband Network (NBN) would improve access to high-speed broadband in regional areas.<sup>22</sup>
- 4.30 Telstra submitted that the NBN, which is being built and operated by a government-owned corporation, is designed to address the perceived market failure in the provision of fixed-line broadband services.<sup>23</sup>
- 4.31 The NBN is planned to provide fixed-line connections (optical fibre or hybrid fibre-coaxial cable) in some areas, fixed-wireless connections in other areas, and satellite access where fixed-line or fixed-wireless technologies are impractical.<sup>24</sup>
- 4.32 Results of recent telecommunications surveys undertaken by the NSW Farmers' Association and the Victorian Farmers Federation indicated that fixed-wireless and satellite-based services delivered as part of the NBN rollout are beginning to be adopted by some farmers.<sup>25</sup>
- 4.33 Further evidence in relation to access to satellite services is discussed later in this chapter.

## Mobile networks

- 4.34 Given the limited availability of fixed-line internet services in rural and remote areas of Australia, the Committee heard that farm businesses are increasingly accessing the internet using mobile networks.
- 4.35 The Victoria Farmers Federation submitted that more than 50 per cent of respondents to its recent telecommunications survey reported connecting to the internet using mobile networks.<sup>26</sup> Representatives of the Federation explained:

... increasingly, our members are connecting to the internet through portable devices and portable machinery ...<sup>27</sup>

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22 Victorian Farmers Federation, *Submission 57*, p. 2; Cotton Australia, *Submission 72*, p. 10; Telstra, *Submission 81*, p. 4.

23 Mr James Shaw, Director, Government Relations, Telstra, *Committee Hansard*, Canberra, 11 February 2016, pp. 2–4.

24 Mr James Shaw, Director, Government Relations, Telstra, *Committee Hansard*, Canberra, 11 February 2016, p. 4. See also: NBN, 'What is the nbn™ Multi Technology Mix?', <[www.nbnco.com.au/blog/the-nbn-project/what-is-the-nbn-multi-technology-mix.html](http://www.nbnco.com.au/blog/the-nbn-project/what-is-the-nbn-multi-technology-mix.html)> viewed 5 April 2016.

25 NSW Farmers' Association, *Submission 45*, pp. 12–13; Victorian Farmers Federation, *Submission 57*, p. 7.

26 Victorian Farmers Federation, *Submission 57*, p. 7.

27 Mr Peter Hunt, Executive Policy Manager, Victorian Farmers Federation, *Committee Hansard*, Melbourne, 29 January 2016, p. 7.

- 4.36 Similarly, the South East Premium Wheat Growers' Association submitted that the Telstra mobile network is now the most common means for people in regional Western Australia to connect to the internet.<sup>28</sup>
- 4.37 Vanderfield Pty Ltd, an agricultural product and service supply company, noted the potential of mobile networks to support innovation in remote areas, but also highlighted the lack of adequate coverage:
- The benefits of being able to offer support to farm businesses without being on site is obviously the greatest in geographically remote regions. However, the irony is that these are often the regions that do not have adequate network coverage to deliver technology enabled benefits ...<sup>29</sup>
- 4.38 Other stakeholders identified network reliability, bandwidth, and the limited availability of fourth-generation (4G) connectivity as barriers to the adoption of mobile technology in the agricultural industry.<sup>30</sup>
- 4.39 The South East Premium Wheat Growers' Association noted that mobile networks are prone to overload and, as a result, demand is often managed by limiting data allowances. The Association also submitted that data charges on mobile networks are expensive relative to the equivalent charges on fixed-line networks.<sup>31</sup>
- 4.40 Telstra submitted that a relatively light regulatory approach had assisted in the development of the mobile sector in Australia, and that coverage in regional Australia was continuing to expand due to competition in the sector.<sup>32</sup> Mr James Shaw, representing Telstra, explained:
- The robust competition that exists today, especially in the mobile sector, has been brought about by a regulatory environment that has rewarded those who are prepared to invest.<sup>33</sup>
- 4.41 Mr Shaw indicated that Telstra had recently invested \$190 million to purchase additional spectrum to meet its commitment of providing 4G network coverage to 99 per cent of the Australian population by June 2017.<sup>34</sup>
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28 South East Premium Wheat Growers' Association, *Submission 83*, p. 1.

29 Vanderfield Pty Ltd, *Submission 79*, p. 15.

30 NSW Farmers' Association, *Submission 45*, pp. 12-13; Grain Growers Limited, *Submission 82*, p. 7.

31 South East Premium Wheat Growers' Association, *Submission 83*, p. 1.

32 Telstra, *Submission 81*, p.2; Mr James Shaw, Director, Government Relations, Telstra, *Committee Hansard*, Canberra, 11 February 2016, pp. 1-2.

33 Mr James Shaw, Director, Government Relations, Telstra, *Committee Hansard*, Canberra, 11 February 2016, p. 1.

34 Mr James Shaw, Director, Government Relations, Telstra, *Committee Hansard*, Canberra, 11 February 2016, p. 1.

- 4.42 However, the University of New England noted that current coverage across all mobile network operators extended to approximately 31 per cent of the Australian landmass.<sup>35</sup>
- 4.43 The University submitted that in open, sparsely populated agricultural areas, there is insufficient demand to justify commercial investment in mobile network infrastructure.<sup>36</sup>
- 4.44 The University went on to suggest that the introduction of roaming arrangements between mobile network providers would increase the effective coverage available to customers in agricultural areas. It also suggested that a requirement for mobile network operators to provide roaming could be attached to public funding, or that in 'non-commercial areas' the NBN could offer fixed-wireless services on a wholesale basis to other mobile network operators, such as Telstra.<sup>37</sup>
- 4.45 The Committee also heard evidence about several technologies that had the potential to expand access to mobile devices in rural and remote Australia in place of traditional mobile networks.
- 4.46 For example, Telstra explained how 'small cell' technology is being developed to increase connectivity in communities where there is no commercial case to establish a mobile network tower. Small cells provide 4G data connectivity to mobile devices in a radius of up to 200 metres and are intended to service towns of 100 to 200 people.<sup>38</sup>
- 4.47 Similarly, CSIRO highlighted its 'Ngara' technology, which is designed to efficiently use spectrum to service geographical areas with low population density and limited telecommunications infrastructure.<sup>39</sup>
- 4.48 Telstra also noted that sensors and devices deployed in the paddock may not send large amounts of data, which may ease network requirements.<sup>40</sup>

### Mobile Black Spot Programme

- 4.49 In May 2014, to improve mobile services in regional and remote Australia, and to stimulate further competition in the mobile sector, the Australian

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35 University of New England, *Submission 11*, p. 7.

36 University of New England, *Submission 11*, p. 7.

37 University of New England, *Submission 11*, pp. 7–8. See also: Victorian Farmers Federation, *Submission 57*, p. 9; Mr Peter Hunt, Executive Policy Manager, Victorian Farmers Federation, *Committee Hansard*, Melbourne, 29 January 2016, p. 7; Mr Maxwell Eastcott, General Manager, Gwydir Shire Council, *Committee Hansard*, Armidale, 13 April 2016, p. 16.

38 Telstra, *Submission 81*, pp. 3–4.

39 CSIRO, *Submission 55*, p. 11. See also: CSIRO, 'Ngara: Next gen wireless' <[www.csiro.au/en/Research/DPF/Areas/Wireless/Wireless-technologies/Ngara](http://www.csiro.au/en/Research/DPF/Areas/Wireless/Wireless-technologies/Ngara)> viewed 5 April 2016.

40 Mr Channa Seneviratne, Director, Wireless Network Engineering, Telstra, *Committee Hansard*, Canberra, 11 February 2016, p. 2.



- Government committed \$100 million to the Mobile Black Spot Programme. The program provides funding to mobile network operators to build or upgrade mobile base stations in locations with inadequate coverage.<sup>41</sup>
- 4.50 In the first round of the program, Telstra and Vodafone committed \$185 million over three years to deliver 499 new or upgraded base stations around Australia. Further funding was committed by state and local governments, businesses, and community organisations.<sup>42</sup>
- 4.51 Telstra explained to the Committee that its \$165 million investment in the program would deliver 429 mobile base stations and 250 small cells over three years in communities that currently have no coverage.<sup>43</sup>
- 4.52 In June 2015, the Australian Government committed a further \$60 million to the second round of the program. The selection process for this round is due to be finalised in June 2016.<sup>44</sup>
- 4.53 While welcoming the government's investment in the program, Grain Growers Limited noted that the new infrastructure proposed under the program is largely not located in the grain belts of Australia.<sup>45</sup>
- 4.54 Similarly, the University of New England submitted that selection criteria used to prioritise investment in new infrastructure are weighted towards areas of high population (or transportation corridors) rather than areas that support broadacre or outdoor horticultural activity.<sup>46</sup>
- 4.55 However, Cotton Australia submitted that the program, along with the ongoing rollout of the NBN, would significantly improve the capacity of regional industries to capitalise on emerging technologies.<sup>47</sup>

## Satellite services

- 4.56 The Committee heard how farmers in areas of Australia beyond the scope of fixed-line, fixed-wireless, and mobile networks rely on satellite-based services to access the internet.<sup>48</sup>

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41 The Hon. Malcolm Turnbull MP, Minister for Communications, 'Investing in Australia's communications infrastructure', *Media Release*, 13 May 2014.

42 The Hon. Malcolm Turnbull MP, Minister for Communications, 'Mobile Black Spot Programme to deliver almost 500 new or upgraded base stations with total investment of \$385 million', *Media Release*, 25 June 2015.

43 Telstra, *Submission 81*, p. 3; Mr James Shaw, Director, Government Relations, Telstra, *Committee Hansard*, Canberra, 11 February 2016, pp. 1-2.

44 The Hon. Paul Fletcher MP, Parliamentary Secretary to the Minister for Communications, 'Abbott Government commits \$60 million to Round 2 of Mobile Black Spot Programme', *Media Release*, 25 June 2015.

45 Grain Growers Limited, *Submission 82*, p. 8.

46 University of New England, *Submission 11*, p. 7.

47 Cotton Australia, *Submission 72*, p. 10.

- 4.57 The University of New England submitted that satellites have the potential to be an ideal telecommunications backbone for connectivity over open areas of farming land. However, the University also noted that existing satellite services are struggling to meet larger-than-expected demand in rural and remote areas of Australia.<sup>49</sup>
- 4.58 The Committee received a range of evidence about the limitations of existing satellite services, such as the Interim Satellite Service introduced as part of the NBN in 2011.<sup>50</sup>
- 4.59 The Victorian Farmers Federation submitted that, while many of its members have access to satellite services, the quality of the connection is highly variable.<sup>51</sup> Similarly, the NSW Farmers' Association noted capacity constraints associated with satellite and other shared-spectrum services.<sup>52</sup> Grain Growers Limited submitted that, in some cases, the Interim Satellite Service provided a poorer service than what was previously available.<sup>53</sup>
- 4.60 As part the ongoing rollout of the NBN, two purpose-built satellites are being launched to deliver broadband services to over 200,000 homes and businesses in rural and remote Australia. The first of the satellites was launched in October 2015, and the new services are expected to be available in the second quarter of 2016.<sup>54</sup>
- 4.61 The Committee heard from several stakeholders who were anticipating the introduction of additional satellite services.<sup>55</sup> However, those stakeholders also noted that changes in user behaviour in response to improved services, combined with already increasing demand for internet services in regional areas, may eventually exhaust the capacity provided by the new satellites.<sup>56</sup>

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48 NSW Farmers' Association, *Submission 45*, pp. 12–13.

49 University of New England, *Submission 11*, p. 9.

50 NBN, 'NBN Co launches Interim Satellite Service for remote Australians' <[www.nbnco.com.au/corporate-information/media-centre/media-releases/nbnco-launches-interim-satellite-service-for-remote-australians.html](http://www.nbnco.com.au/corporate-information/media-centre/media-releases/nbnco-launches-interim-satellite-service-for-remote-australians.html)> viewed 5 April 2016.

51 Victorian Farmers Federation, *Submission 57*, p. 16.

52 NSW Farmers' Association, *Submission 45*, p. 12.

53 Grain Growers Limited, *Submission 82*, pp. 7–8.

54 NBN, 'Sky Muster™ service', <[www.nbnco.com.au/connect-home-or-business/information-for-home/satellite.html](http://www.nbnco.com.au/connect-home-or-business/information-for-home/satellite.html)> viewed 5 April 2016.

55 South East Premium Wheat Growers' Association, *Submission 83*, p. 1; Mr David McKeon, General Manager – Advocacy and Policy, Grain Growers Limited, *Committee Hansard*, Canberra, 22 February 2016, p. 8.

56 Grain Growers Limited, *Submission 82*, pp. 7–8; South East Premium Wheat Growers' Association, *Submission 83*, pp. 1–2.

- 4.62 In addition to using satellites to provide connectivity to households, Telstra noted the organisation was investigating options for satellites to provide economical backhaul for wireless networks in rural areas.<sup>57</sup>
- 4.63 Lastly, the University of New England noted the importance of flexible service plans to support an increasing number of connected devices across agricultural land.<sup>58</sup>

## Adoption of data services

- 4.64 In addition to issues related to access to telecommunications infrastructure, the Committee heard evidence about a range of impediments to the adoption of data services for agriculture.
- 4.65 The Committee was pleased to observe the best practice efforts of the University of New England SMART Farm and the Australian Centre for Field Robotics. They are important examples of successful practical application of data technology services. The Committee also commends these organisations for the inclusion of farm businesses in the R&D process.
- 4.66 At a fundamental level, the Committee heard that a barrier to the adoption of data services was the cost and effort of generating sufficient data to support analysis and decision making.<sup>59</sup>
- 4.67 More broadly, CSIRO outlined the capability required to support the widespread collection and analysis of agricultural data:
- The key social challenge in the digital revolution will be to provide platforms for farmers to store, access, re-use and even market their own data with appropriate protections of ownership and privacy. These farm-scale data will need to be ‘fused’ with broader scale national and regional data streams covering issues such as climate, soils, water, and biodiversity.<sup>60</sup>
- 4.68 Further evidence related to the adoption of data services is discussed in the remainder of this section as follows:
- data standards;
  - data ownership and access; and

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57 Mr Channa Seneviratne, Director, Wireless Network Engineering, Telstra, *Committee Hansard*, Canberra, 11 February 2016, p. 5.

58 University of New England, *Submission 11*, p. 9.

59 NNNCo Pty Ltd, *Submission 34*, p. 3; Mrs Jennifer Medway, Manager Investing in People, RIRDC, *Committee Hansard*, Canberra, 22 October 2015, p. 3.

60 CSIRO, *Submission 55*, p. 11.

- security and privacy.

## Data standards

- 4.69 The Committee heard that, while the use of data services in agricultural production is already emerging, there may be a risk of fragmentation and dysfunction due to a lack of coordination between existing initiatives or the use of local or proprietary data standards.<sup>61</sup>
- 4.70 The Australian Centre for Field Robotics submitted that a lack of coordinated data and safety standards for robotic systems is preventing their incorporation onto the farm, and that such standards would enable interoperability between hardware and software providers and the adoption of open source software.<sup>62</sup>
- 4.71 Other issues raised in evidence include the challenge of ensuring that connected devices adhere to a commonly accepted standard and that data generated by such devices is machine-readable, reliable, and accurate.<sup>63</sup>
- 4.72 CSIRO submitted that there is growing evidence of market failure in Australia in the provision of fit-for-purpose data services and suggested that there may be a role for government to participate in the development of a data platform to address both public and private interests.<sup>64</sup>
- 4.73 CSIRO noted that the organisation is currently investigating the feasibility of a network service – potentially via a co-operative or not-for-profit business model – to support data services in rural industries.<sup>65</sup>

## Data ownership and access

- 4.74 The Committee heard that as increasing amounts of data are generated in the agricultural industry, uncertainty in relation to data ownership and appropriate access to data may pose a barrier to the adoption of data services.<sup>66</sup>
- 4.75 Southern Farming Systems and the Australian Controlled Traffic Farming Association submitted that farmers might only participate in the collection

61 NNNCo Pty Ltd, *Submission 34*, p. 5; CSIRO, *Submission 55*, p. 11.

62 Australian Centre for Field Robotics, *Submission 94*, p. 8.

63 NNNCo Pty Ltd, *Submission 34*, p. 7; Entrevators Pty Ltd, *Submission 62*, pp. 2-3; Mrs Jennifer Medway, Manager Investing in People, RIRDC, *Committee Hansard*, Canberra, 22 October 2015, p. 3.

64 CSIRO, *Submission 55*, pp. 6, 11; See also: Grain Growers Limited, *Submission 82*, p. 8; United States Studies Centre, University of Sydney, *Submission 39*, pp. 4-5.

65 CSIRO, *Submission 55*, p. 11.

66 Dr Lindsay Campbell, University of Sydney, *Submission 31*, p. 5; DAWR, *Submission 88*, Appendix B: 'Example of barriers to adoption – ownership and use of big data', p. 15.

and storage of agricultural data if they trust that the information is used for the benefit of the farmer who supplied it.<sup>67</sup>

- 4.76 The Department of Agriculture and Water Resources (DAWR) noted that, in cases where data is collected from farming equipment, there needs to be agreement between the producer and the equipment manufacturer regarding ownership of, and rights to, the data. For example, DAWR suggested that manufacturers could be restricted from selling producer data to third parties without prior agreement.<sup>68</sup>
- 4.77 The Committee also heard about initiatives underway to make more agricultural data openly available.<sup>69</sup>
- 4.78 The Rural Industries Research and Development Corporation (RIRDC) suggested that there was recognition by government, but also in the private sector, of the increases in productivity that greater access to data may enable. However, it also suggested that there may be less incentive in the private sector to release data, and that intellectual property restrictions could prevent some data from being disclosed.<sup>70</sup>

## Security and privacy

- 4.79 Lastly, as increasing numbers of sensors and devices are connecting to the internet and transmitting information from the paddock, the Committee heard that network security is becoming an important consideration.<sup>71</sup>
- 4.80 The DAWR submitted that businesses may be reluctant to invest in mapping, data analysis or cloud-based technologies that offer inadequate protection or de-identification of sensitive data.<sup>72</sup>
- 4.81 Similarly, Australian Pork Limited submitted that, in the pork industry, confidence in the privacy and security of agricultural data throughout the supply chain is essential.<sup>73</sup>

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67 SFS-ACTFA, *Submission 61*, p. 10.

68 DAWR, *Submission 88*, Appendix B: 'Example of barriers to adoption - ownership and use of big data', p. 15.

69 Mrs Jennifer Medway, Manager Investing in People, RIRDC, *Committee Hansard*, Canberra, 22 October 2015, p. 3; Global Open Data for Agriculture and Nutrition <[www.godan.info/](http://www.godan.info/)> viewed 6 April 2016.

70 Mrs Jennifer Medway, Manager Investing in People, RIRDC, *Committee Hansard*, Canberra, 22 October 2015, p. 3.

71 Mr Channa Seneviratne, Director, Wireless Network Engineering, Telstra, *Committee Hansard*, Canberra, 11 February 2016, p. 2.

72 DAWR, *Submission 88*, Appendix B: 'Example of barriers to adoption - ownership and use of big data', p. 15.

73 Australian Pork Limited, *Submission 70*, pp. 3-4.

- 4.82 The Plant Biosecurity Cooperative Research Centre (CRC) submitted that internet security is a ‘non-negotiable’ requirement for the adoption of many of the advances that are available to better protect Australian agriculture from biosecurity threats.<sup>74</sup>
- 4.83 The CRC also submitted that internationally-agreed regulatory frameworks for data management were essential to the process of capturing data that informs biosecurity management.<sup>75</sup>
- 4.84 However, the Committee heard that issues related to data confidentiality are beginning to be resolved as information and security technologies are becoming integrated into governance, risk management, and planning for government and businesses.<sup>76</sup>

### Committee comment

- 4.85 It is clear from evidence received by the Committee that limited access to reliable and affordable telecommunications services poses an ongoing barrier to the adoption of emerging technology in the agricultural sector.
- 4.86 Lack of access to telecommunications services compromises the ability of farmers and farming businesses to embrace innovative technology and increase productivity. More generally, such services are increasingly becoming essential to maintaining lively and prosperous communities in rural and remote Australia.
- 4.87 The Committee acknowledges the significant practical and commercial impediments to achieving comprehensive coverage in rural and remote Australia.
- 4.88 As such, the Committee supports an ongoing role for government in ensuring that agricultural businesses have access to reliable, affordable telecommunications services to serve as a platform for new and emerging agricultural technology.
- 4.89 The Committee strongly supports the ongoing rollout of the National Broadband Network across rural and remote Australia.
- 4.90 As fixed-wireless coverage expands, and as new satellite-based services become available later this year, the Committee is confident that the NBN will significantly improve access to modern, high-speed internet in homes and businesses across the country.

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74 Plant Biosecurity Cooperative Research Centre, *Submission 36*, p. 7.

75 Plant Biosecurity Cooperative Research Centre, *Submission 36*, p. 7.

76 DAWR, *Submission 88*, Appendix B: ‘Example of barriers to adoption – ownership and use of big data’, p. 15.

- 4.91 However, the Committee also acknowledges the importance of connectivity in the paddock, which enables farmers to work more productively and adopt a range of new and emerging agricultural technologies.
- 4.92 The Committee has identified a need for further improvement in the provision of on-farm wireless networks that are compatible with the internet services available in remote areas.
- 4.93 Given its expertise in this area, the Committee considers that CSIRO is best placed to investigate cost-effective approaches to using the NBN as backhaul for on-farm wireless networks.

### **Recommendation 1**

**The Committee recommends that the Commonwealth Scientific and Industrial Research Organisation, in cooperation with industry, undertake a technical study to identify cost-effective approaches to using satellite services as backhaul for local wireless networks for agricultural applications.**

- 4.94 The Committee is also of the view that there is scope for further expansion of mobile networks in rural and remote Australia.
- 4.95 The Committee supports the rollout of mobile network infrastructure under the Mobile Black Spot Programme, and notes the strong industry engagement in the initial rounds of the program.
- 4.96 The Committee strongly encourages the Australian Government to make an ongoing commitment to the program beyond the second round.
- 4.97 Under any expansion of the program, the Committee would support changes to the criteria used to select black spot locations in order to more accurately capture the telecommunications requirements and usage patterns associated with new and emerging agricultural practices.
- 4.98 For example, the Committee envisages the selection criteria could have reference to the number of connected devices, which would capture the deployment of numerous low-bandwidth sensors across the agricultural landscape.

## Recommendation 2

**The Committee recommends that the Australian Government commit to the continuation of the Mobile Black Spot Programme beyond the second round, and that the Department of Communications and the Arts consider changes or additions to the selection criteria to capture the telecommunications requirements of agricultural activity.**

- 4.99 In addition, the Committee considers there is scope for the more effective use of existing mobile network infrastructure, as well as infrastructure to be delivered under the Mobile Black Spot Programme. In particular, in areas where only one network offers coverage, or where there is partial overlap between networks, roaming arrangements between network operators could significantly improve the effective coverage available to farmers in the paddock.
- 4.100 As such, the Committee would support additional measures that encourage mobile network operators to offer cost-effective roaming services to customers in these areas.

## Recommendation 3

**The Committee recommends that the Australian Government, in consultation with industry stakeholders, investigate incentives for mobile network operators to provide roaming services in rural and remote areas.**

- 4.101 The Committee notes the importance of access to adequate telecommunications infrastructure in agricultural areas, and is therefore keen to monitor the rollout of telecommunications services and their impact on innovation and the uptake of emerging technology in the agricultural sector over the coming years.
- 4.102 The Committee notes that there may be a period of transition as services in some communities are improved before others, and as new services become available to farm businesses.
- 4.103 To assist in this transition, the Committee considers there is a need for timely and accurate information to be provided to farm businesses about the availability of the range of telecommunications services available in



their particular area, or about the anticipated timeframe for improved services.

- 4.104 Such information would assist farm businesses in planning for the adoption of new technology and making informed investment decisions.

#### **Recommendation 4**

**The Committee recommends that the Department of Agriculture of Water Resources, in conjunction with public and private infrastructure providers, publish consolidated information about the availability of telecommunications services in rural and remote agricultural areas.**

- 4.105 The Committee expects that information published by the Department would include existing and planned internet and mobile network services, including services provided through the ongoing rollout of the NBN and the Mobile Black Spot Programme. The Committee expects that this information would be consolidated and made easily accessible.
- 4.106 Further to this recommendation, the Committee supports the provision of education to ensure that farmers have sufficient information to determine how and under which circumstances they may benefit from emerging telecommunications-based technology.
- 4.107 Specifically, the Committee considers that practical information about the application of telecommunications and data services should be delivered by producer groups, in conjunction with TAFEs, training providers, and local leaders on the ground. The Committee is of the view that the Council of Rural Research and Development Corporations, in conjunction with universities and other research providers, is best placed to coordinate the development and delivery of educational material to assist in this process.

#### **Recommendation 5**

**The Committee recommends that the Council of Rural Research and Development Corporations, in conjunction with research and training providers and producer groups, coordinate the development and delivery of educational resources to raise awareness of innovative applications of telecommunications services across the agricultural industry.**

- 4.108 The Committee considers that, taken together, these recommendations will assist agricultural businesses in adopting new technologies and services as the appropriate infrastructure becomes available.
- 4.109 The Committee also notes the potential positive impact of data services on productivity in the agricultural sector. The Committee is of the view that some barriers to the adoption of these services will be resolved as technology matures and the associated industry develops.
- 4.110 However, the Committee acknowledges that there may be role for government in the development of appropriate standards to facilitate a greater adoption of data services in the agricultural industry. The Committee notes evidence that CSIRO is currently investigating initiatives in this area.