The Broadband Futures Forum

The Australian Broadband Advisory Council Agri-Tech Expert Working Group Report

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Abstract: On 21 October 2021, TelSoc hosted the tenth Broadband Futures Forum, held online, to discuss a report by the Australian Broadband Advisory Council (ABAC) on the future of Agricultural Technology (Agri-Tech). After an introduction by the chair of ABAC, the two co-convenors of the ABAC Expert Working Group that produced the report outlined its content. Discussion following the speeches focussed particularly on the usefulness and efficiency of local solutions to extending wireless coverage, and the role of government and private investment in regional areas.

Keywords: Broadband, agricultural technology

Introduction

The Broadband (formerly NBN) Futures Project (Holmes & Campbell, 2019) has been organizing a series of public forums under the title Broadband Futures to encourage debate, and potentially to build consensus, about the future of Australia's National Broadband Network (NBN) and a National Broadband Strategy for Australia (Holmes *et al.*, 2020). The forums are hosted by TelSoc (the Telecommunications Association Inc, publisher of this *Journal*) and have been held regularly since July 2019.[i] The tenth in the series, held on 21 October 2021, was entitled "The Australian Broadband Advisory Council AgriTech Report" and provided an overview of the report by the Agri-Tech Expert Working Group for the Australian Broadband Advisory Council (ABAC) (ABAC, 2021).

The remainder of this paper summarizes the content of the Forum.

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The NBN Futures Forum

The Forum was conducted online via Zoom, with at least 50 participants online. Dr Jim Holmes, President of TelSoc, chaired the Forum.

Introduction to ABAC

Ms Deena Shiff, the chair of the ABAC, noted that ABAC had been formed by the Minister for Communications in 2020 to stimulate the take-up of broadband applications and to improve the economic benefits from broadband. ABAC, after a short scoping study, has concentrated on sectors with a high likelihood of benefit from broadband but where take-up might be further expedited.

The report from the Agri-Tech Expert Working Group is the first output from ABAC. Other expert groups are working on eHealth (jointly with health stakeholders, including the Department of Health); Construction, with an emphasis on small and medium enterprises (SMEs) and regional activities; and Creative Industries, to tap into the growing market for developing streaming content.

Deena Shiff suggested that there are three common threads in these studies: better targeting of public funds in relation to telco developments and investments; skills development; and digital inclusion. There would be a continuing emphasis on development in regional Australia.

She indicated that ABAC sees its role as bringing people together to achieve a common understanding of issues, rather than just policy formulation. The emphasis, she said, is to stimulate action to effect change.

The Agri-Tech Expert Working Group Report

Ms Andrea Koch and Mr Peter Waters, the convenors of the expert working group, outlined the contents of the report.

The expert working group addressed the question: 'What are the challenges for digital agriculture in Australia?' The Commonwealth Government has adopted the ambitious goal established by the National Farmers' Federation of increasing the gross production value of Australian agriculture from $60 billion to $100 billion by 2030. A recent paper by the Bureau of Communications, Arts and Regional Research (BCARR, 2021) estimates that the additional economic benefit from digital technologies could be between $3.0 and $10.6 billion per year (in 2017–18 dollars) for the agricultural sector by 2029–30, which represents an additional boost to economic activity in agriculture of between 4.7% and 16.9% by 2030.

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The Agri-Tech Working Group considered three questions.

Question One: Does a 'connectivity threshold' exist in regional and rural Australia where connectivity becomes an enabler of digital agriculture, rather than a drag on it?

'Yes' there is a connectivity threshold, and 'no' it has not been passed. Connectivity to support digital agriculture is required across the entire farming operation, and not just at the homestead: connectivity is needed out in the paddock for a range of digital technologies including soil moisture probes and controlling gates; down by the creek, dams and bores for real-time monitoring of water usage; on the move around the farm to support digitally enabled tractors' work; and above the farm as drones strike at weeds.

The report found that, beneath the broad brushstrokes of coverage from mobile networks and National Broadband Network (NBN) fixed and wireless networks, there are localised connectivity gaps on, across and between farms. The report called this patchiness 'salt and pepper connectivity'.

The report provides a case study of Tony, a cotton farmer 8 kms outside Narrabri. In an effort to achieve greater labour and water efficiency, Tony has spent $1.5 million on a large lateral irrigator with an onboard Subscriber Identity Module connected to the mobile network. The idea is that the 'robot' irrigator can roll across the farm watering at night and can 'call out' by messaging Tony's mobile phone when it has fallen over and needs him to get out of bed to right it. Tony's farm is within line of sight of a mobile tower on a mountain about 45 kms away. However, as coverage is patchy and variable on his farm, he cannot count on the 'robot' being online, and so he still has to get up during the night to manually check it.

Question Two: If the threshold has not been crossed, what connectivity is required for digital agriculture to be put in place and what measures can be taken to get it in place?

If the problem is 'salt and pepper' connectivity, the ultimate goal has to be ubiquitous connectivity across farms; or, as NBN Co puts it, "no paddock left behind". However, the report concludes that national-scale carrier mobile and fixed wireless networks are not necessarily the best way of achieving that goal.

National carriers may continue to be the primary providers of connectivity in rural Australia, but their focus – in terms of both technology and business outcomes – is on serving premises and 'people on the move' along transport corridors.

As Figure 1 from the report (ABAC, 2021, p. 34), adapted from Connected Farms (2022), illustrates, the connectivity option that is suitable for a particular application will depend on its bandwidth and performance requirements.

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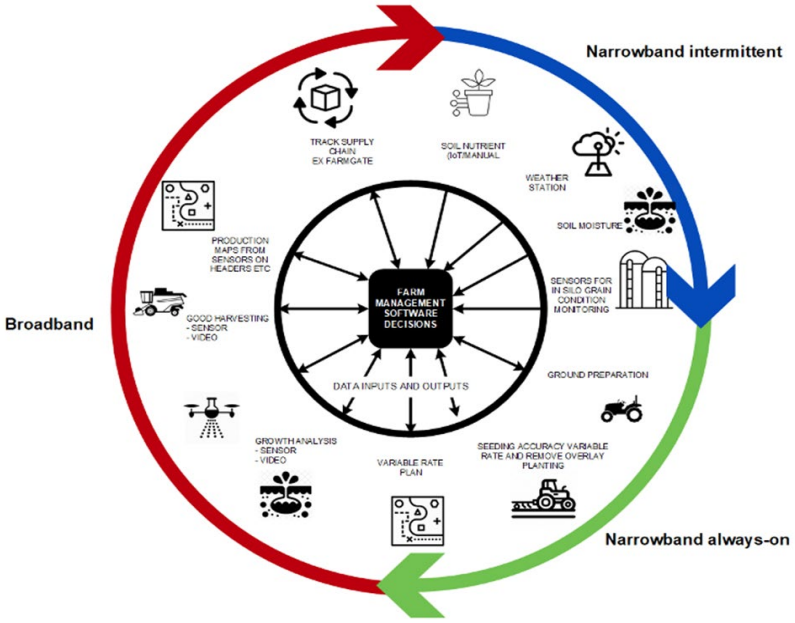

Figure 1. Matching the connectivity mix with the use-case requirements (ABAC, 2021, p. 34)

The report identified the emergence of alternative approaches in the market, including farmers installing bespoke solutions and a cohort of second-tier retail service providers (RSPs) who are filling in the 'salt and pepper', including some world leading Australian innovators such as Myriota ("Myriota Everywhere", n.d.), a low-earth-orbit satellite provider, and Zetifi ("Last-mile connectivity", 2021), which have developed a low cost Wi-Fi tower that a farmer can drop off the back of a utility vehicle.

As a principal of a regional agricultural college put it: "When as a local community we started to tackle connectivity issues, we thought it was all about mobile, but we have learnt there are more cost-effective options."

Question Three: If, or once, the threshold is crossed, what other measures would promote adoption of digital agriculture off the back of that connectivity?

Technology cannot exist in a vacuum without the skills needed to support users in their buying decisions, in operating the technology, and in making use of its outputs. The report identified a 'skill stack' (Figure 2) needed to support digital agriculture.

These support skills need to be 'close at hand' for farmers: if a farmer depends on remote telemetry to control irrigation pumps on the farm, there is the risk of significant production loss if the technician has to drive hundreds of kilometres to fix the problem.

More Government-supported training is needed to build up these skill sets. There are some good exemplars in place, including university demonstration farms like the University of New England Smart Farm, the private Longerenong College in Victoria and the South Australian Government AgTech demonstration farms. However, much more work is needed

to deliver training across the whole skill stack, and not just at the application level.

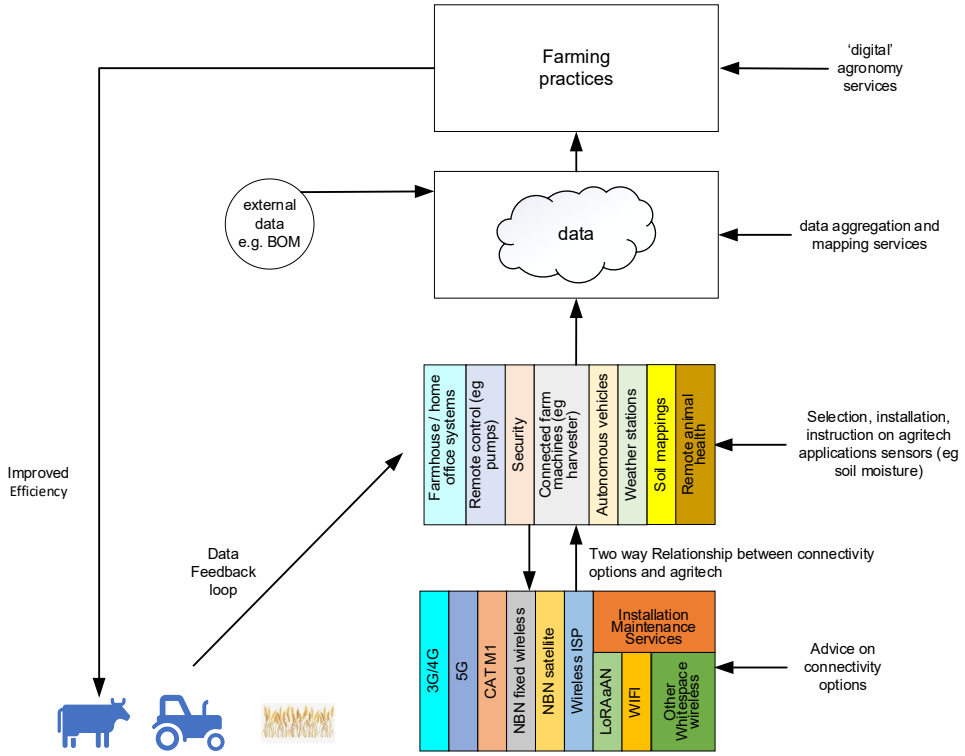

Figure 2. Local ecosystems of digital skills and support (ABAC, 2021, p. 56)

Recommendations

While the report has a range of recommendations, the key 'transformers' are:

- Pushing out more fibre backhaul in rural areas. Rural communities point in frustration at fibre cables running through their communities on the way to somewhere else, like a bullet train which rushes through a local station without stopping. Existing fibre also can be 'locked up' in state government agencies, like transport, health or electricity, because they do not have a remit to consider broader economic and social development goals. The report notes that we are on the cusp of a new wave of fibre deployment, such as by the Macquarie Bank-acquired Vocus and Bevan Slattery's HyperOne, which provides Governments with an opportunity to get in on the ground floor to plan more 'fibre off-ramps' in rural Australia.
- Combining fibre backhaul with low-cost wireless infrastructure using class licensed or white-space spectrum. This powerful combination is at the core of rural connectivity programs in the UK and US. While the Australian Communications and Media Authority (ACMA) is currently consulting on 6 GHz-band class licensing for Wi-Fi and 4/5G applications, it is taking a more conservative approach, such as by lower maximum transmitter power

rules (which reduces coverage). However, ACMA has taken some positive steps, such as area licensing for apparatus.

- NBN Co needs to work with service providers and communities in rural areas on finding solutions which 'stretch' the boundaries of the NBN wireless footprint to migrate customers from the NBN satellite service, which provides a less satisfactory service on parameters such as latency and reliability. NBN Co, and the other carriers, need to be more open to using emerging network software which enables 'heterogeneous' networks, such as Zetifi's Wi-Fi cells hanging off carrier networks.
- 'Salt and pepper' connectivity is better solved by community-led or involved programs. Agricultural activities vary between regions, from broad-acre grain farming in the wheat belt, to cotton farming on the Western Plains, to horticulture in Northern Queensland. Local communities best understand the range of needs and priorities for connectivity across their region, and have demonstrated a willingness to co-invest. Local communities 'owning' the outcome also may help break down the current negative cycle between carriers and local communities.

The future is bright for digital agriculture in Australia. However, crossing the connectivity threshold and solving the problem of 'salt and pepper' connectivity remains a major gateway for future success. The ABAC Agri-Tech report shines a light on what is needed.

Questions and Discussion

In commenting on the emphasis on local solutions in the report, both Andrea Koch and Peter Waters noted that agriculture is a place-based activity and that local communities had shown initiative in providing community-based solutions to local requirements.

Jim Holmes noted that a number of questions could be summarized as: "What happens next?" Peter Waters described his aim as reframing the debate about rural connectivity. Rural communities had been upset about the lack of connectivity from mobile carriers. At the same time, governments had engaged in a 'push/pull' dynamic with carriers: 'push' through regulation of service provision; 'pull' through funding such as support to remove mobile blackspots. The report suggested that mobile carriers are unable to provide all the communications solutions needed for agriculture and that there are alternative solution providers who can.

When asked about the future of the expert working group itself, Andrea Koch indicated that it would not continue to meet, and that further work to progress the recommendations would be undertaken by ABAC and via the relevant Ministries. Deena Shiff noted that similar issues

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were being identified in the Health Expert Working Group: lack of connectivity in regional areas; lack of support for place-based initiatives; and insufficient coordination between the actions of State and Federal governments. She indicated that ABAC has requested funding for geo-mapping of needs so that governments could identify 'hot spots' of need. She suggested that greater continuity of actions (as, for example, with continuity between triennial rural telecommunications reviews), coordination of Federal funding with State-identified needs, and post-implementation reviews would lead to better targeted sets of investments.

There were questions about how to tackle the skills development that had been identified as a problem in the report. Peter Waters suggested that, while technical skills may be available locally to support in-building communications, support and confidence would be required to extend those skills to outside solutions, such as installing and supporting a wireless weather station. Andrea Koch noted that there was a general shortage of skilled labour for agriculture, made worse by the COVID crisis, and that there would be increased competition for the limited skills base for technical communications installation and maintenance. Deena Shiff remarked that training for advanced communications skills was often fragmented. One reform would be to have an agreed curriculum, promoted by the Digital Skills Agency, based on the needs of Australian agriculture. There could also be better coordinated use of highly skilled individuals to "train the trainers".

A questioner had suggested that public networks did not extend to supporting enterprise networks and that 'salt and pepper' connectivity on farms is really a business issue for the farm enterprise. Andrea Koch noted that, while significant private investment had gone into farm connectivity solutions, the majority of farms are still SMEs, which could attract government support for their generic needs, including communications. Digital technology has quite rapidly become a big issue for agriculture since the 2015 regional telecommunications review.

In contrast, another questioner suggested that multiple private network extension solutions for farms were economically inefficient and wasteful if a public wireless solution could be adapted to provide the solution. Andrea Koch responded that the issue was scale: the national-scale solutions provided by the carriers did not always meet the needs of individual localities — in all networks the "last mile" had to be adapted for local conditions. Peter Waters added that the report had identified many local solutions that could be used and that there are existing businesses, other than carriers, that can provide these solutions at scale.

The questioner maintained, however, that a public network solution for one farm would then be able to be used at neighbouring properties; this would be an efficient use of investment.

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Deena Shiff noted that many regional extensions of communications networks are already being privately or locally funded, meaning that government-funded and carrier-funded investments are at increasing risk of being bypassed by local initiatives.

In response to a comment from the audience, Andrea Koch supported the idea of community workshops at the local level to identify communications needs for the area and propose solutions to be implemented. She hoped that such workshops would be held in many regional communities.

There was a question about whether or not the expert group had considered the power and energy needs for telecommunications solutions. Peter Waters replied that this had not been included in the report, but he pointed to the current US infrastructure program that included combining telecommunications and alternative energy sources in a "whole of utility" approach in underserved areas.

In concluding remarks, Deena Shiff foreshadowed the report of ABAC's Health Expert Working Group, which has subsequently been published (ABAC, 2022) and will likely be the subject of a future Forum.

Jim Holmes, in closing the Forum, noted that TelSoc had made a submission to the Regional Telecommunications Review and was hoping that this review would lead to substantive and ongoing action.

Conclusion

This was the tenth of a planned series of forums related to the future of the NBN and a broadband strategy for Australia. It was the first to review a report from the Australian Broadband Advisory Council.

The report identified that network availability, whether from public mobile networks or the NBN, was patchy in many regional areas. Notably, the NBN (geostationary) satellite services, which cover the whole country, were not seen as fulfilling the needs for agri-tech business operations. To overcome the patchiness, several businesses, some operating at scale, and many local solutions were identified for filling in the gaps.

The report recommended, however, that better use could be made of the telecommunications infrastructure that does exist. More fibre backhaul could be provided from existing fibre cables running through regional areas. NBN Co and its Retail Service Providers could look at ways to extend its Fixed Wireless Access service and move customers off the satellite services. NBN Co and the mobile carriers could be more open to connecting "extension" networks, such as wide-area Wi-Fi or low-cost wireless infrastructure.

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Nevertheless, the report's authors believed that local solutions, based on a consensus on community needs, would identify a suitable pathway to providing the wide-area wireless services that agri-tech businesses need. To support and maintain such solutions, an array of digital skills and training would be required to provide the necessary regional workforce.

Providing communications across regional Australia has always required creative adaptations of existing technology. In the voice era, the Digital Radio Concentrator System (Martell *et al.*, 1986; Moorhead, 2019) extended the phone network across large areas of the country at low cost. Similar creativity will need to be applied to satisfy the new digital requirements across the wide agricultural areas with, mostly, a low density of end terminals. Whether this creativity will come from public carrier networks or private local solutions is yet to play out.

Acknowledgement

The summary of the discussion and the commentary in the Conclusion were written by Leith Campbell.

References

Australian Broadband Advisory Council (2021). Agri-Tech Expert Working Group, June 2021. Available at https://www.infrastructure.gov.au/sites/default/files/documents/agri-tech-expert-working-group.pdf (accessed 3 February 2022).

Australian Broadband Advisory Council (2022). Health Expert Working Group, January 2022. Available at https://www.infrastructure.gov.au/sites/default/files/documents/abac-hewg-report.pdf (accessed 4 February 2022).

BCARR [Bureau of Communications, Arts and Regional Research]. (2021). Working paper—Economic impact of ubiquitous high speed broadband: agriculture sector. Australian Government, Department of Infrastructure, Transport, Regional Development and Communications. https://www.infrastructure.gov.au/sites/default/files/bcarr-working-paper-economic-impact-ubiquitous-high-speed-broadband-agriculture-sector.pdf (accessed 13 March 2022).

Campbell, L. H. (2019). The NBN Futures Forum: Realising the User Potential of the NBN, *Journal of Telecommunications and the Digital Economy*, *7*(4), 1–11. https://doi.org/10.18080/jtde.v7n4.228

Campbell, L. H. (2020a). The NBN Futures Forum: Learning from International Experience, *Journal of Telecommunications and the Digital Economy*, *8*(1), 49–57. https://doi.org/10.18080/jtde.v8n1.251

Campbell, L. H. (2020b). The NBN Futures Forum: Towards a National Broadband Strategy for Australia, 2020-2030, *Journal of Telecommunications and the Digital Economy*, *8*(4), 180–191. https://doi.org/10.18080/jtde.v8n4.372

Campbell, L. H. (2021a). The NBN Futures Forum: Regional and Rural Broadband Access, *Journal of Telecommunications and the Digital Economy*, *9*(2), 1–10. https://doi.org/10.18080/jtde.v9n2.400

Campbell, L. H. (2021b). The NBN Futures Forum: The Rise of 5G and the NBN, *Journal of Telecommunications and the Digital Economy*, *9*(3), 1–11. https://doi.org/10.18080/jtde.v9n3.432

Campbell, L. H., & Milner, M. (2019). The NBN Futures Forum: Discussing the future ownership of Australia's National Broadband Network, *Journal of Telecommunications and the Digital Economy*, *7*(3), 1–9. https://doi.org/10.18080/jtde.v7n3.202

Campbell, L. H., & Mithen, J. (2021). The Broadband Futures Forum: Affordability of Broadband Services, *Journal of Telecommunications and the Digital Economy*, *9*(4), 127–137. https://doi.org/10.18080/jtde.v9n4.468

Campbell, L. H., Smith, A. C., & Brooks, P. (2020). The NBN Futures Forum: Social and Economic Benefits of Broadband for Digital Inclusion and Telehealth, *Journal of Telecommunications and the Digital Economy*, *8*(3), 18–32. https://doi.org/10.18080/jtde.v8n3.346

"Connected Farm Pathways". (2022). Connected Farms Pty Ltd. https://www.connectedfarms.com.au/farm-connectivity/ (accessed 9 February 2022).

Holmes, J., Burke, J., Campbell, L. H., & Hamilton, A. (2020). Towards a National Broadband Strategy for Australia, 2020-2030, *Journal of Telecommunications and the Digital Economy*, *8*(4), 192–269. https://doi.org/10.18080/jtde.v8n4.371

Holmes, J., & Campbell, L. H. (2019). The NBN Futures Project, *Journal of Telecommunications and the Digital Economy*, *7*(4), 33–44. https://doi.org/10.18080/jtde.v7n4.238

"Last-mile connectivity for vehicles, machinery & farms". (2021). Zetifi. https://zetifi.com/ (accessed 3 February 2022).

Martell, P. H., Lopes, P., Worsdell, G., & Bannister, G. P. (1986). The Digital Radio Concentrator System — DRCS, *Telecommunication Journal of Australia*, *36*(3), 3–22.

Moorhead, S. (2019). The Digital Radio Concentrator System, *Journal of Telecommunications and the Digital Economy*, *7*(4), 65–88. https://doi.org/10.18080/jtde.v7n4.242

"Myriota, Everywhere". (n.d.). Myriota. https://myriota.com/ (accessed 3 February 2022).

Pritchard-Kelly, R., & Costa, J. (2022). Low Earth Orbit Satellite Systems: Comparisons with Geostationary and Other Satellite Systems, and their Significant Advantages, *Journal of Telecommunications and the Digital Economy*, *10*(1), 1–22. https://doi.org/10.18080/jtde.v10n1.552

Endnote

[i] The first forum was held in July 2019 (Campbell & Milner, 2019), the second in October 2019 (Campbell, 2019), the third in February 2020 (Campbell, 2020a), the fourth in August 2020 (Campbell, Smith & Brooks, 2020), the fifth in November 2020 (Campbell, 2020b), the sixth in March 2021 (Campbell, 2021a), the seventh in May 2021 (Campbell, 2021b), the eighth (Pritchard-Kelly & Costa, 2022) in August 2021, and the ninth also in August 2021 (Campbell & Mithen, 2021).

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