Submission

2016 National Research Infrastructure Roadmap
Capability Issues Paper

Name	Department of Agriculture and Water Resources
Title/role	
Organisation	Department of Agriculture and Water Resources

Question 5:   Should research workforce skills be considered a research infrastructure issue?

The Department of Agriculture and Water Resources considers that research workforce skills should be considered a research infrastructure issue as a lack of technical expertise would present a barrier to the use of research facilities. Human capital is a critical part of national research infrastructure capability. Considering skills and expertise as part of a research infrastructure strategy would provide certainty to researchers and may result in greater retention of expertise. This is consistent with the broader government policy direction to encourage Australians to study and pursue careers in science, technology, engineering and mathematics.

Question 10:   What financing models should the Government consider to support investment in national research infrastructure?

The Department of Agriculture and Water Resources recognises that the capital and running costs of research infrastructure can be high, and that a sustainable funding model is needed to provide assurance to researchers and industry that facilities will continue to be available for their use.

While some research infrastructure may be used for commercial purposes, a commercial funding model will often be unviable as commercial returns from the investment may be limited or non-existent, or not realised in the short to medium-term. Due to the high costs of major research infrastructure, a full cost-recovery model may impose high user fees that discourage researchers and industry from using the facilities, and may see research being moved offshore or discontinued. The department notes that international research facilities are generally government supported, with pricing policies that encourage the use of the facility.

The funding model should be flexible enough to allow for user-pays access to the facilities where this is possible. The fee structure should take into account public and private benefits of the research being undertaken at the facility.

Environment and Natural Resource Management

Question 18:   Are the identified emerging directions and research infrastructure capabilities for Environment and Natural Resource Management right? Are there any missing or additional needed?

Improving environmental and agricultural outcomes for farmers and the broader community will require better integration of people, networks and technologies to make best use of emerging technologies in sensors and sensor networks. These will need to be linked with data streams emerging from international satellite-based remote sensing, improved weather forecasting, local soil information and model-data fusion capabilities to build resilience to seasonal variability and increases in climate extremes. Input from new soft networks – involving participants from governments, research, private and commercial interests sharing knowledge, skills and data via the internet/cloud – is needed to optimise and build on existing data sets, especially for soils. This will enable establishment of baseline states for the Australian land surface for monitoring and reporting on the success of interventions, as well as delivering the information needed by land managers to increase the profitability and sustainability of agricultural production.

In addition to data capture, the capacity and capability to generate and manage complex data and models for water resource systems in ways that support better management decisions is becoming increasingly important as Australia's population grows and competition for finite water resources increases. Data management capability is required to integrate rainfall, surface and groundwater data from measurements, modelling and remote sensing. Modelling and remote sensing are particularly important in areas such as northern Australia where historical measurement-based data is limited. Many parts of the country also lack comprehensive real time water resource information; provision of this information would strengthen the ability of policy makers and water providers to implement the principles of the National Water Initiative that underpin water entitlements and investor, community and farmer confidence in access to secure and affordable water.

Primary producers are obviously affected by weather and climate conditions. Accurate short-term, multi-week and seasonal forecasts, and longer-term climate predictions, are vital to enable producers in the agriculture, fisheries and forestry sectors to make the right business decisions day-to-day and for their future operations. Continued improvement in earth systems models, particularly the Australian Community Climate and Earth System Simulator (ACCESS), will obviously assist primary producers to make more informed decisions, increasing their profitability and thus the strength of rural communities. The department is conscious that research on such models requires extremely high performance computing capacity, currently provided by the National Computational Infrastructure.

National Security

Question 27:   Are the identified emerging directions and research infrastructure capabilities for National Security right? Are there any missing or additional needed?

The strength of Australia's biosecurity system depends on the ability to undertake effective surveillance and diagnostics. What's missing is both a 'soft network' and technological infrastructure in some areas.

The establishment of 'soft networks' will build linkages between technological institutions and build capability, particularly through emerging technologies such as next gen sequencing (NGS) and genomics. This could build on established government networks and be widened to include

specialists in research institutions and biosecurity data from a wide range of stakeholders, including farmers.

Technological advances enable greater automation of surveillance and diagnostics, with data from remote monitoring and sensors, both fixed (e.g. surveillance cameras and automated image recognition), mobile devices (e.g. smart phones and drone technology) and molecular techniques (NGS and genomics). Such capability is important to deal with the rapid increase in the movement of goods, conveyances and passengers across Australia's borders. The volume of data is potentially massive (Big Data) and requires supporting infrastructure to collect, store, analyse and interpret the data, to obtain the intelligence necessary to manage the increasing risk and threat of biosecurity incursions. The infrastructure will encompass big data-capable automated sensors, diagnostic and analytical tools (e.g. rapid genetic sequencing), data storage, analysis and reporting systems.

Biosecurity research infrastructure of this type also contributes to maintaining and complementing animal health and biosecurity research capability such as provided through the Australian Animal Health Laboratory and Elizabeth Macarthur Agricultural Institute.

The infrastructure will enable everyday access and use by a wide user base, including biosecurity specialists and the general public, underpinning citizen science and the national premise of 'biosecurity is everyone's concern'.