

**2016 National Research Infrastructure Roadmap
 Capability Issues Paper Submission**

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Agriculture represents a significant slice of Australia's economy

Australian agriculture occupies 50% of Australia's landmass and represents over 20% of Australia's exports with a value of approximately \$44 billion in 2014. However, recent data suggest that yield per hectare in a number of key Australian crops have plateaued over the last decade. Despite only employing approximately 2.5% of Australia's workforce, negative changes in agricultural production have a disproportional effect on Australians living in regional and rural areas.

Agriculture is undergoing a digital transformation

Agriculture is undergoing a digital revolution. This extends from the development of elite geography-specific germplasm to the use of autonomous electrically powered farm equipment with a low marginal cost of deployment. This infrastructure will be supported by decision support systems that rely on real time information provided by embedded and mobile sensor networks underpinned by long term weather and climate data.

What national research infrastructure is required to catalyse this transformation?

In order to support this digital transformation in agriculture, Australia will need to ensure that researchers have access to national facilities producing relevant agricultural information. We envisage sensor networks to gather weather and available soil moisture data, centralized repositories of information for use in decision support for farmers and finally an underlying infrastructure to enable the realtime communication of information. While it is likely that the private sector will fund the widespread deployment of much of this infrastructure, it will be imperative for demonstration projects to be funded on a national or regional basis.

Given the fundamental transformation of the sector, there will also need to be national facilities to undertake research and extension in specific areas, hostile soils, autonomous vehicles and elite germplasm are relevant examples.

Proposed governance and funding model for national facilities

ACPF Pty Ltd recognises that there is an inherent challenge in the financing of national facilities. While there is an undisputed role for government in collaboration with research institutions to fund the construction and operation of major national facilities, it is less clear about when and how that support should be withdrawn (if at all). We propose a general framework against which to consider initial and continued investments without commenting on where individual investments are in the framework.

This Round	Last 2-3 Rounds	> 4 Rounds
High Risk Deployment	On the Cusp of Commercial	Ubiquitous
<ul style="list-style-type: none"> • New • Expensive • Experimental • Commercial business model not defined 	<ul style="list-style-type: none"> • A few examples in operation • Some operating experience • Commercial business model in development or trialed 	<ul style="list-style-type: none"> • Many examples in operation • Competes with private sector • Commercial business model proven
Full funding, capital and operating. Capacity allocated on merit	Partial funding plus user charges	No funding

Answers to specific questions

#	Question	Response
2	Are these governance characteristics appropriate and are there other factors that should be considered for optimal governance for national research infrastructure?	<p>Governance of national facilities should be independent of any single research institution and be able to manage the facility effectively for all stakeholders.</p> <p>In particular, governance should anticipate loss of funding.</p>
5	Should research workforce skills be considered a research infrastructure issue?	<p>Research workforce skills are critical for Australian research competitiveness. However, a lack of supply suggests a failing of employers (research institutions) to provide either appropriate career paths, remuneration or job security.</p> <p>We see it as the responsibility of employers to provide an appropriate environment to attract and retain researchers and support staff with the capability required to undertake high impact research.</p>
9	What should the criteria and funding arrangements for defunding or decommissioning look like?	See table above. When a national facility is competing with the private sector it's activities should be moved into the private sector.

#	Question	Response
18	<p>Are the identified emerging directions and research infrastructure capabilities for Environment and Natural Resource Management right? Are there any missing or additional needed?</p>	<p>This section appears to be an uneasy juxtaposition of the natural environment measuring and modelling sciences, and the very practical industry directed sciences of agriculture and resource extraction. We would suggest that while the capabilities for these two areas have significant overlap and will share significant resources, that emerging areas and directions for these are clearly separated and delineated.</p>