

# Final Report and Action Agenda

CANBERRA SCIENCE & INNOVATION PRECINCT



Supported by



**ACT**  
Government

## CONTENTS

Executive Summary .....	1
Introduction .....	3
Drivers .....	3
Process .....	4
Scope.....	4
Stakeholder Involvement .....	5
The Vision .....	6
Action Agenda.....	7
Recommendations .....	8
Opportunity Areas .....	9
1: A Truly Digital Capital.....	11
2. Prospering On The Australian Continent.....	13
3: Supporting Future Populations.....	15
4: Building High-Value Physical/Digital Systems.....	17
Conclusion .....	19
Workshop Participant Feedback .....	20

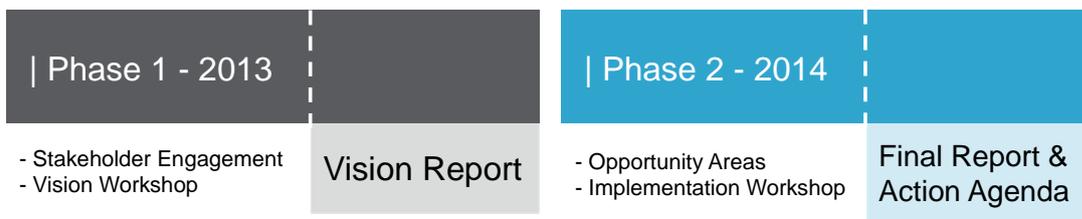
## EXECUTIVE SUMMARY

The global community faces significant challenges around issues of food, energy, health and biosecurity. Achieving growth while limiting adverse environmental impacts requires clever and sustainable solutions. Australian science is well positioned to respond to these challenges within a resource constrained economic environment. More than ever, emphasis is being placed on fostering collaborations at all levels to enhance the efficiency and effectiveness of the national innovation system.

In this respect Canberra is in a unique position. Many of the key institutions and agencies that make up the national innovation system are Canberra based. Furthermore, a number of significant organisations are present or represented in the region, and there is also a growing opportunity in the context of collaborations such as the Canberra Innovation Network (CBRIN) for local small and medium enterprises (SMEs) to add further value to a knowledge-driven economy for the ACT. Collectively, there is an opportunity to rethink the current approach to science, research and innovation in Canberra and be strategic about big challenges of the future.

In response to these opportunities The Australian National University (ANU), CSIRO and the ACT Government put together the Canberra Science and Innovation Precinct (CSIP) project undertaken by ANUedge. The project was initiated by ANU and CSIRO with assistance from the ACT Government under the Strategic Opportunities Funding Program. The goal was to scope a coherent Canberra-wide approach to research funding, collaboration, and commercialisation.

### Canberra Science and Innovation Precinct - Timeline



The project developed through a process of research, interviews, and workshops with the representatives of key institutions and interested parties.

In 2013 the first phase of the planning process set about framing a Vision for science and innovation collaboration in Canberra. This Vision responded to many relevant trends and drivers and the need to address challenges such as organisational cultural barriers to collaboration, identification of areas of leading science of global standing, existing perceptions of Canberra as merely a 'government town', and to create a shared strategy.

The Vision is a clear call to respond to the opportunities, to work together, and act. It suggests that by collaborating effectively on issues of national and global importance, Canberra's top science capabilities produce opportunities based on innovative and sometimes disruptive technology. CSIP would help to strengthen local SMEs, provide links to global industry partners, and help grow Canberra's economy through effective industry engagement. It was suggested that such collaboration should have a particular positive impact on 5 areas:

- Science and Research
- Policy Engagement
- Economic Impact
- Social Impact
- Connectivity and Visibility

This second phase of the project completes the high level planning by identifying the key Opportunity Areas and outlining an Action Agenda. The focus was on areas of existing strength in order to narrow the scope. Four areas were investigated in some depth:

**1: A Truly Digital Capital** - By developing big data science CSIP would connect researchers and industry to the world and provide big, challenge-focused projects with key data analysis capabilities.

**2. Prospering On The Australian Continent** - Australian ecosystems require effective collaboration on practical solutions to environmental resource allocation problems such as water, energy, climate adaptation, and pollution.

**3: Supporting Future Populations** - By linking up the ANU and CSIRO strengths in crop science CSIP could provide the complete development process from fundamental research through to economic exploitation and entrepreneurial activity in the bio economy.

**4: Building High-Value Physical/Digital Systems** - Data science requires new sensing and measurement systems and combinations of systems. CSIP could combine open data and open system platforms and make them available to add value to research and industry.

These areas provided information about what is required to make effective collaboration happen in those disciplines in Canberra. These included details of requirements, challenge, and possible benefits. Collaboration on this level needs to focus on large challenges with global significance. The opportunity areas represent some possibilities. However, they may need to be refined or reformulated to provide the required focal point and an initial chance to prove the effectiveness of institutional collaboration.

At the implementation workshop the executive group refined this information into a concise Action Agenda covering the appropriate commitment, people, and funding. Buy-in to the purpose, vision and the specific big challenges was emphasised. Other requirements included long-term stability and consistency and a competitive, bottom up, process to identify solutions and projects. Finally, whichever opportunities are chosen they should be underpinned by effective connections between ICT capabilities and domain expertise.

The consensus of the participants in the process is that, though there are obstacles, the opportunities for individuals, institutions and the ACT make this sort of collaboration worth the effort. Therefore the main recommendations are that:

- The key partnerships are promptly formalised to maintain the current momentum and enthusiasm.
- The key partners convert the widespread commitment to collaboration and partnership into a workable model that is competitive and effective.
- The project is given a clear mandate and the leadership required to engage with whole institutions.
- The key partners must find and commit the resources, funds, and staff time to make it sustainable and effective for the long term.

## INTRODUCTION

Increasingly there is pressure to address the big economic, health and environmental challenges that face our region, nation, and the globe. On the other hand research and science funding sources are harder to secure. This tension is keenly felt through international competition in a country such as Australia and the dynamic is particularly challenging for a small region like the ACT. The ACT has a significant concentration of Australia's research institutions and agencies. As it stands, Canberra's universities make a considerable contribution to the region's economy. Last year:

*... the universities directly employed 5,424 people and supported 11,500 full-time jobs across the ACT, generating 12.6 per cent of the ACT payroll tax, or \$41 million... every dollar of expenditure on the universities returned 80 cents of value to the local economy.<sup>1</sup>*

Despite the size of the research sector in Canberra institutions do not tend to collaborate at an institutional level. Efforts to improve cross-institutional collaboration have been discussed for decades. Teams and individual researchers often collaborate but this has generally not been mirrored at higher organisational levels. If high quality research that is effectively applied is to be valued, then this situation needs to change.

There is an opportunity to respond by rethinking the current approach to science, research and innovation in Canberra, particularly in areas of existing or developing strength such as data science, crop and plant science, environmental informatics, and high tech systems and manufacturing.

This current opportunity to build collaboration represents a unique chance to act. This project and other efforts like it, such as innovation networks, incubators and co-working spaces, have recently seen the beginning of a new direction. These initial efforts need to be backed by consistent institutional commitment and resources.

## DRIVERS

In recent years there is increased government pressure on publically funded research organisations to develop effective collaborations with and derive funding from industry and the private sector. Increasingly even theoretical and speculative research sees the benefits of clear links to applied research and commercialisation capabilities. Any opportunity to form these links and gain greater profile and external connections is seen as attractive all around.

The project's research, workshops and interviews all concurred that the significant science and research capabilities in Canberra tend to be poorly connected to industry. For example, participants were asked to nominate established industry partners who could be called on or included in the process. The lists provided were consistently short and limited. The concern about the lack of industry links and collaboration was widely expressed throughout the

---

<sup>1</sup> ABC News Online, Canberra, (<http://www.abc.net.au/news/2014-12-02/canberra-universities-contribute-over-a-billion-to-act-economy/5932950>) [Accessed December 2, 2014]

beginning of the project. This conclusion seems to be borne out by the evidence and is a particular problem for research institutions such as ANU looking for alternative sources of funding or routes to apply or commercialise their research.

Local developments also feed into the motivations behind exploring a science and innovation precinct. CSIRO is in the process of co-locating all of their ACT research at their Black Mountain site, with great opportunities to connect with ANU and other organisations such as Geoscience Australia, Bureau of Meteorology, Bureau of Statistics, and University of Canberra.

There have also been a number of specific recent efforts aimed at improving local innovation and collaboration. The Entry29 co-working space and the Griffin Accelerator have found a home within the new Canberra Innovation Network (CBRIN). These efforts have acted as focal points and they have received broad positive support from the large research institutions in Canberra.

However, in each case, the collaboration is focused on smaller scale local innovation and does not directly engage with the core research activities of ANU, CSIRO and others. Again, there is also a notable absence of industry. Innovation efforts in the ACT have been growing but need more connections and industry involvement to lift it to the next level.

Finally, the 2013 election of the Abbott Government reinforced the awareness of Canberra's vulnerability as a 'one company town'. Any changes in the Australian Public Service can have a huge effect on the local economy. There is therefore a need for Canberra to develop a sustainable and diversified economy. The existing strengths in science and research present the opportunity to make this a true knowledge based economy.

## PROCESS

The participants in this process therefore set about framing a vision and plan of action to address these challenges. The result is that ANU and CSIRO, with the support of the ACT Government, are committed to engaging stakeholders and together developing a plan to recast the way that they collaborate in the ACT. The result is an action agenda for a successful precinct.

### Scope

The project was initiated by ANU and CSIRO with assistance from the ACT Government under the Strategic Opportunities Funding Program to enable a coherent Canberra-wide vision for CSIP to be developed. First, a steering committee was established to guide the process. This committee identified a Vision Group made up of 20-30 opinion leaders and decision makers from key institutions and groups. The Steering Committee also guided the broader engagement with around 100 individuals, organisations, and government agencies, representing all facets of the Canberra science and innovation community.

The initial round of engagement through surveys, interviews, and a workshop fed into the process to produce a collective vision for CSIP and formed the basis for developing an inclusive, clear and achievable plan. In Phase 2 focus groups delved into the details of the opportunities and challenges and refined the scope. Finally, the Implementation Workshop identified some key actions required to make CSIP a reality.

## **Stakeholder Involvement**

The strategic roadmapping methodology was selected for its highly structured, participatory approach that allows a group of stakeholders to develop a shared understanding of their environment, their future plans and a context to discuss the key challenges and opportunities. Consultations, surveys, and a workshop were all conducted according to this approach.

From the initial consultation process through to the final workshop, the message repeated time and again was that such an enterprise is long overdue and would be welcomed. Most survey respondents and interviewees readily identified possible benefits for their own organisations. What is left is for the participating organisation to take on the Vision and commit to implementing the Action Agenda.

## THE VISION

At the Vision Workshop, in October 2013, stakeholders developed the elements of a broad shared vision in response to the most pressing trend and drivers. The collated version states:

*CSIP will establish a framework that allows the best brains from research, government and industry to effectively collaborate on challenges of national and international significance. CSIP will serve as a beacon for a globally visible brand acting as a honey pot to attract talent, global corporations, and new businesses. It will have lasting impact in five key areas: Science and Research; Policy Engagement; Economic Impact; Social Impact; and Connectivity and Visibility.*

Participants also formed visions for five specific impact areas:

- 1. Science and Research:** Become a globally recognised provider of choice for research; building on identified existing strengths such as systems science, ICT, and the natural sciences.
- 2. Policy Engagement:** Support the formulation of public policy informed by research in targeted key strategic areas and in turn leverage policy connections to realise better research outcomes.
- 3. Economic Impact:** Foster the development of connections to 5-10 world leading corporations in the context of a vibrant innovation ecosystem. This ecosystem will be a conduit to global connections, facilitate cost effective research, and implement knowledge to increase the value of Australian firms
- 4. Social Impact:** Build a model of interaction that improves mobility and recognition of contribution between science, government and industry organisations to provide a unique quality of life and access to skills, through collaboration in areas of major differentiation for Canberra/Australia.
- 5. Connectivity and Visibility:** Facilitate the breakdown of historic organisational and cultural barriers to build a globally visible 'Brand Canberra'. Open up access to shared facilities and data to facilitate cross-disciplinary research and collaboration.

The vision statement's common message is the importance of effective collaboration. CSIP should enable science in Canberra, through collaboration, to be more than just the sum of its parts. To do this it needs to fulfil a number of vital support and facilitation roles, linking actors together, coordinating shared capabilities, and putting the research on the global stage. Such a precinct will also help to ensure that really good science is encouraged and gains a high profile. The consistent theme throughout the vision is that CSIP needs to make a difference. CSIP can make for better, more visible science, allow for better public policy, better economic outcomes and more successful businesses, make a difference in Canberra, Australia, and internationally. Such a vision is necessarily broad and non-specific and sets out the common basis upon which all the participants can collaborate.

## ACTION AGENDA

The Action Agenda provides a number of concrete steps to be pursued across the four Opportunity Areas. These were developed in the implementation workshop participant's discussions around the specifics of the opportunity areas. The participants then generalised and prioritised the most important actions:

1. ANU and CSIRO need to promptly decide on the model for partnership and commit funding and recruit core staff to support the aims of collaboration and commercialisation. The success of CSIP requires appropriate commitment, people, and funding.
2. The key Canberra research institutions need to sign up to the purpose, Vision and the specific big challenges that will guide and drive the collaboration.
3. Long-term stability and consistency must be built into the planning, funding and staffing of CSIP from the start.
4. CSIP must establish a competitive, bottom up, system or process to identify solutions and projects to be funded and supported. (Similar to CRC or ARC Centre of Excellence processes).
5. CSIP should build effective connections between ICT and Canberra's world-leading domain expertise.

These actions overlap at points and share some common themes. The project team can therefore suggest some conclusions that can be drawn from consensus expressed in the workshop. Firstly, there are no significant or insurmountable roadblocks to this type of collaboration. Moreover, there are distinctive opportunities and competitive advantages that can be realised. The challenge is, having tested the waters, to maintain the positive momentum and make the most of the enthusiasm and support for this endeavour. Therefore the main recommendations are that:

- The key partnerships are promptly formalised to maintain the current momentum and enthusiasm.
- The key partners convert the widespread commitment to collaboration and partnership into a workable model that is competitive and effective.
- The project is given a clear mandate and the leadership required to engage with whole institutions.
- The key partners must find and commit the resources, funds, and staff time to make it sustainable and effective for the long term.

### *Additional Actions*

There were also other actions that were identified by participants as being important. Communication of the goals and actions of CSIP will be important both for participants and other stakeholders. CSIP needs investment in communications and engagement to help pitch the what, why, and how to CSIP participants and the broader community. The recommendation is that CSIP appoints advocates with national and international profiles to explain why the opportunities must be grasped.

CSIP can act as a 'front door' for industry to access science knowledge and research capabilities. It could facilitate an 'open lab' to expose the wider innovation community to the region's research activity and Canberra's unique publically funded research infrastructure or it could run an annual 'IP garage sale' to publicise and commercialise the products of new research.

Finally there needs to be clear, agreed upon performance indicators for the ACT, ANU, and CSIRO in order to achieve the CSIP goals. They should include measures of commitment and staffing and should seek to produce effective long-term engagement with industry.

The priority is to identify an opportunity area addressing a global challenge where these efforts can be coordinated and focused. The Opportunity Areas explored in this process are offered as possibilities but need refinement and the clear support of ANU and CSIRO as areas that fit with their priorities and strengths.

### *Additional Recommendations*

Implementation of CSIP needs to facilitate effective collaboration between ANU, CSIRO, and ACT strengths in order to enhance those strengths and attract industry to engage with Canberra. It then needs the delegated authority and the resources to engage with industry on a national and international level and allow it connect with research and local innovation.

Whatever name or shape it takes, CSIP needs to be effectively branded so that it communicates its purpose. In some ways the term 'precinct' can be unhelpful. In many minds it conjures up images of old fashioned 'technology parks'. It can overemphasise secondary issues of buildings and infrastructure. However, the need for a physical expression of the core collaborations should not be minimised. Collaborators from all sides need to physically meet, discuss, and interact. Industry needs a place to come, a front door to walk through, and a wall to which they can affix their corporate logos. These are not things that a virtual network or an umbrella concept can provide. The face-to-face interactions must lead the way and be helpfully supported by digital networks and services.

CSIP needs to lead the required changes. It is unclear what sorts of internal actions and changes are needed by the key institutions in order to make CSIP style collaboration a success. No doubt changes to the structures, practices and cultures of some of our large institutions would help. However, efforts to collaborate will fail if significant internal changes are a precondition for beginning. Instead CSIP needs to offer a neutral space that founding institutions can enter on their own terms and experience successful collaboration and industry engagement. The recent founding of CBRIN is a possible example. This might then lead to any internal changes, if they are required.

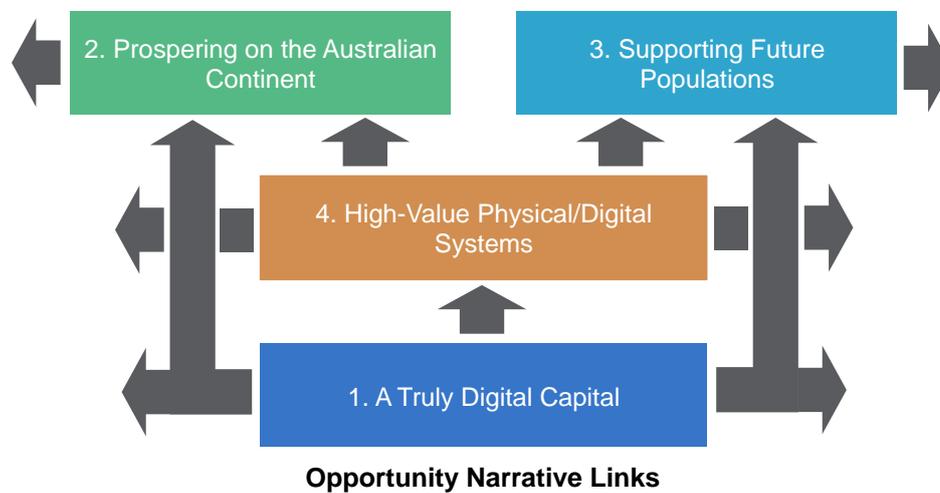
Finally, CSIP needs a model for engaging academic expertise with all levels of industry in a way that helps all parties. A purely market driven approach or a purely research driven agenda will fall short of this goal. What is needed is a model of collaboration and co-design that identifies and refines problems and solutions to address the big challenges that face us.



## OPPORTUNITY AREAS

The CSIP process focused on four Opportunity Areas (OAs). The concept behind the Opportunity Areas is that they provide the focus and rationale for connecting expertise together and collaborating towards achieving the Vision. Though they can be seen as separate opportunities they have significant synergies. Opportunity Areas one (A Truly Digital Capital) and four (Building High-Value Physical/Digital Systems) provide the technical expertise to fulfil the motivating challenges in Opportunity areas two (Prospering on the Australian Continent) and three (Supporting Future Populations).

These Opportunity Areas began as a longer list of general suggestions of 'areas of strength' by the executive group during the first phase of the project. In the implementation planning phase focus groups were held on the top four topic areas.



There are a number of ways that these areas can be conceptualised and linked with a narrative. One approach is represented above. This sees Canberra's digital capabilities underpinning the other opportunities, potentially by supporting the creation of high-value physical/digital systems. This breakdown places opportunities 2 and 3 as the rallying points but recognises that benefits can flow out at all stages.

The Focus Groups consisted of group leaders, technical officers, researchers, and industry representatives within each area and explored each area's specific opportunities and challenges. Through a guided process they were asked what they hope to achieve through their research, what challenges they face, and what institutional collaboration and other actions might do to overcome those specific challenges.

This focus group data was presented to the Implementation Workshop where the executive group reassessed the areas and also highlighted the critical links between these areas. The following pages discuss the four Opportunity Areas in more detail and specify the types of capabilities and institutions they would involve, and a rationale for their importance. The key challenges are also assessed and presented along with possible solutions.

## 1: A TRULY DIGITAL CAPITAL

Data Science presents new tools and perspectives for looking at complex problems. By collaborating around data science CSIP could help to make Canberra the epitome of a modern, connected democratic capital, with a data-minded government with new services and a digitally engaged populace. It will connect researchers and industry to the world with collaboration across institutional or discipline boundaries; providing big challenge led projects with expertise driven capabilities. Utilising Open Access Data will bring people with ICT skill sets to work with scientists, agencies and broader expertise. This needs to be surrounded by a bottom up, innovative, entrepreneurial ecosystem generating and testing ideas powered by a healthy digital culture comfortable with data, open access and open thinking.

Much work is already being done to make this a reality. The ACT's "Digital Canberra" initiative aims to accelerate the development of a high growth digital economy with infrastructure and skills. CSIP will help bring ICT expertise to bear on translating cutting edge research for broader societal impact. Data science will provide the link between specific deep domain expertise to other areas of research and broader applications.

For this to work CSIP needs to link top research in other areas to cutting edge data science research, commercialisation, and application. It also requires further development of the local ICT skill base.

Capabilities	Organisations/Expertise	Rationale
Deep domain expertise and capability	ANU/CSIRO/Geoscience Australia (GA): Plant Science, Renewable Energy, Ecosystem Science, Medical, Earth, Space.  ANU/UC: Demography, Population Health, Democracy, Economics, Government Agencies etc BoM	Deep domain expertise organised such that the 'best' is developed and promoted.
ICT as transformative capabilities - breakthrough outcomes	National ICT Australia (NICTA), The Australian National University (ANU), CSIRO, Academy of Interactive Entertainment (AIE)	There is a fundamental need for a transformative change. Where deep technology capabilities are utilised and connected to needs.
ICT as enabling capabilities (eg connectivity, visualisation etc.) - applying ICT to improve production etc,	Lockheed Martin (LM), Intellidox etc. Established pathways to market. Improve productivity and service delivery etc.  Digital entrepreneurial capability Canberra Innovation Network (CBRIN), Digital Canberra Challenge etc.	Catalyse and energise a culture that is not bounded by current thinking.  Get new ideas to market/application
ICT skills building	ANU, UC, AIE	--

The most important challenges that arise from the opportunities around big data relate to enabling collaboration between the various Canberra institutions.

Obstacles	Rating	Solution
Alignment of culture, institutional strategies and priorities of the collaborating institutions and knowledge of how to collaborate.	Critical	"Clarification of roles recognition of value to each institution (e.g. through promotion) Driver from the top & aligned to joint goals"
Developing incentives that engage the necessary people, energy and resources.	High	Institutional Champion with appropriate influence and funding. Creative approach to promotion and reward. Enabling more self organisation of team."
Identify the major challenges	Medium	Prize based competition to decide on key challenges.
Finding people with skills in ICT and domain expertise.	High	Professional Masters in data science and software engineering.
Matching obligation for collaborative funding.	High	Remove need to for matching funding (Comment: Funds = Commitment)
Government procurement policies	NA	--
Catalysing areas of focus, and broader version and digital collaboration challenge.	NA	CBRIN, Digital Canberra, Challenge, CollabIT etc.

### Institutional Representatives: Big Data Invitees

Dr Dale Roberts, Maths, ANU

Dr Glenn Roe, College of Arts and Social Sciences, ANU

Dr David Nisbet, Research School of Engineering, ANU

Dr Robert Ackland, Research School of Social Sciences, ANU

Mr CrisKennedy, CSIRO Discovery Centre

Asst Prof Geoff Hinchcliffe, University of Canberra

Dr Steph Mellor, Think Place

Dr Ben Evans, National Computational Infrastructure (NCI)

Dr Keith Ayotte, CTO, Windlabs

Mr George Dunford, National Library of Australia

## 2. PROSPERING ON THE AUSTRALIAN CONTINENT

CSIP could help the nation prosper, working with the unique challenges and benefits of our wide brown land. Canberra has a critical mass of networkers and expertise focused on practical solutions to environmental resource allocation problems such as water, energy, climate adaptation, and pollution. Canberra's geographic position is sensitive to many of the major environmental challenges like water management and the ACT already taken valuable steps toward renewable energies that fit the Australian ecosystem.

Improving environmental resource allocation has both economic and social benefits. CSIP will need to connect and integrate the existing environmental research, data, and modelling. This data can then be used to develop and refine forecasting and allocation analysis tools. The results of this can inform public policy and debate and form the basis for data provision and visualisation businesses.

The implementation workshop broke this opportunity down into three parts; the research and modelling, application of this information and tools, and finally the public communication and implementation of policy. As such, this Opportunity Area connects significant strengths in ANU (The Fenner School in particular) and CSIRO core research with many of the federal bureaus and agencies such as Geoscience Australia (GA), the Bureau of Meteorology (BoM) with ICT and data analysis, and finally communication and policy channels.

Capabilities	Organisations	Rationale
Integrated resource dynamic modelling: land, water, atmosphere, pollution	Geoscience Australia (GA), Bureau of Meteorology (BoM), CSIRO, ANU, Integrated Catchment Assessment and Management Centre (iCAM), Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), Australian Centre for International Agricultural Research (ACAIR), Rural Industries Research & Development Corporation (RIRDC), Windlabs	Know what exists where.
Forecasting and allocation analysis tools	NICTA, ABS, CSIRO Digital flagship, ABARE, NCI, Windlabs	Model and forecast benefits of changes in allocation.
Public communication and implementation of policy.	ANU Crawford, CSIRO Discovery Centre, Academy of Science, CSIRO Advocates, Chief Scientist, ACT Government, Federal Government Questacon	Inform the public and government about environmental challenges and solutions.

The key challenges for environmental informatics in Canberra relate to identifying the common goals that can unify the various research organisations and government agencies and attract interest, funding, and commercialisation.

Obstacles	Rating	Solution
Agreement on purpose and goals. Agreeing project priorities and best challenge to work on.	Critical	CSIP Leadership, Competitions, Sandpits etc.
Funding for stable collaboration projects/programs	High	International funding Genuine collaboration from partners Grand challenge funding, networked involvement: Business, researchers, government. (citizen science)
Improving external perceptions of what researchers do.	High	Involving impacted parties, Plain English and clear communication, Practical short-med-long term deliverables.
Enabling public good and private profit, Sharing the benefits.	High	--

### Institutional Representatives: Environmental Informatics

Prof Peter Kanowski, Forestry, Fenner School of Environment & Society, ANU

Prof Albert Van Dijk, Water and Landscape Dynamics, Fenner School, ANU

Mr Chris Pulkkinen, Managing business strategy and projects at ACTEW Corporation, ACTEW

Dr Michael Vardon, Visiting Fellow, Fenner School, ANU

Prof Michael Raupach, Climate Change Institute, Fenner School, ANU

Dr Dan Walker, Integration Science, CSIRO

Dr David Lemon, Principal Research Scientist, Land and Water, CSIRO

Mr Peter Fitch Program Leader, Environmental Information Systems Land and Water, CSIRO

Dr Neil McKenzie, Principal Research Scientist, Land and Water, CSIRO

Dr Paul Tregoning, Photogrammetry & Remote Sensing, Research School of Earth Sciences, ANU

Dr Helen Cleugh, Oceans & Atmosphere Flagship, CSIRO

Dr Ben Evans, Associate Director, National Computational Infrastructure (NCI)

### 3: SUPPORTING FUTURE POPULATIONS

CSIP could build the bio-economy and contribute to improving the living conditions of humanity through efficient and effective production of food, energy and pharmaceuticals. These global issues are multi-faceted and require interdisciplinary approaches. ANU and CSIRO strengths in plant and crop science could form an established foundation. They can also add health research, economic, social and policy research and support that is required in a developing bio-economy.

The opportunity is to take full social and economic advantage of this area of world leading and globally distinctive research. ANU and CSIRO's strengths in crop and plant science can be enhanced with the addition and integration of cutting edge data science. Gene research generates opportunities for data analysis and optimisation. CSIP could help to link up the process from fundamental research through to economic exploitation and entrepreneurial activity and policy development. The overview developed by at the implementation workshop envisions Canberra hosting the full life cycle from deep research to commercialisation to the publicising of the success.

Capabilities	Organisations	Rationale
1. Deep Research	ANU, CSIRO, NICTA	Globally distinctive research. World leading provides the insights/break through that leads to
2. The Invention	ANU/CSIRO etc. interfaced with application expertise eg Grains Research & Development Corporation (GRDC), multinational agri-business, smart people	Research leads to the invention key to innovating invention is open institution engaging with innovation community. Opening up opportunities for invention
3. Innovation: Leveraging invention to innovate	Innovation support services - CBRIN, Entry29, ICT Information Services, Griffin Accelerators/mentors	Turn invention into innovation
4. Commercialisation of ideas	Business development and support - CBRIN/Mentors Sources of funding: Early stage VC, Government, Angels, etc.	Commercialise the innovation for the benefit of the economy
5. Exporting to solve world problems	Austrade, Business support services, CBRIN, Mentors, Trade Missions, ACT Government	Big ideas could be 'born global' to maximise economic impact a social benefit of economy
6. Talent Attraction	ANU/CSIRO/UC, publicity, branding - celebrating successes	Celebrate success and create the honey pot to attract more talent and continue the cycle.

Though Canberra has world leading plant and crop science expertise and capability the challenge is to make it last and count. This requires gaining support, building a critical mass and, and ensuring stability.

Obstacles	Rating	Solution
Top level support and commitment from stakeholders and particular key drivers	Critical	Stakeholders to nominate and support champions (with resources) to drive ahead.
Stability	Critical	Commitment/Never stable, need to be robust to change – not static
Achieving critical mass as a key measure of success	High	Silicon basin environment must attract talent
Rate of progress of technology makes it hard to stay in front	High	Integrate with cutting edge researchers, tech staff, and industry.
Identify what high value product development systems exist	Critical	Full value chain from fundamental research through to economic exploitation and entrepreneurial activity in the bio economy.

### Institutional Representatives: CROP AND PLANT SCIENCE

Dr Spencer Whitney, Gene Expression (Incl. Microarray And Other Genome Wide Approaches)  
College of Medicine, Biology and Environment, ANU

Prof Barry Pogson, ARC Centre of Excellence in Plant Energy Biology, ARC Centre of Excellence for Plant Energy Biology, ANU

Dr Mikael Hirsch, Food, Health and Life Sciences Industries Group, CSIRO

Prof John Carver, Research School of Chemistry, Research School of Chemistry, ANU

Prof Chris Easton, Research School of Chemistry, Research School of Chemistry, ANU

Prof John Evens, ARC Centre of Excellence for Translational Photosynthesis, ANU

Prof Steve Swain, Research Director, Agriculture Flagship, CSIRO

#### 4: BUILDING HIGH-VALUE PHYSICAL/DIGITAL SYSTEMS

The combination of open data and open system platforms represents a significant opportunity to add value to research and industry. In this new paradigm of engineering digital components must work in concert with physical components. Beyond the fabrication of individual components new global challenges require the combination of components into complex systems.

Collaboration in this area will open doors, attract people, investment, knowledge and funds. It will allow moving with change and being ready to embrace future opportunities as they arise. It will require connecting all the steps from the original deep research, invention, application and commercialisation of those ideas to the publicising of the successes to attract new researchers and innovators. It will also require contributions from capabilities outside of Canberra and building the critical mass of people, industry, technology, and competency around data innovation.

Capabilities	Organisation	Rationale
"Silicon Basin"	ICT Companies, Big Data Capabilities, High powered computing, ANU, CSIRO, NICTA, Big Business, Entrepreneurs, start-up culture, Business Incubator, Business Development Support, SMES"	Establish technology systems
Integration Stakeholders	Business development support, Research/ industry/government interface Marketing, Communication by precinct and partners "viral"	Global reach and data access - "honey pot"
ACT Local Government and Federal Government support: policy, tax, fun	ACT Government, Business Development support organisations, ANU, CSIRO, Big business such as Lockheed Martin, Siemens	Enable translation and applications

The key challenges focus on building effective connections between the research institutions and industry and commercial opportunities. Issues of research communication and protection

Obstacles	Rating	Solution
"IP - getting ideas out of institutions, As per 2 - enabling public good and private profit"	Critical	Look to US rules re availability of products of publically funded research
Communication of research outcomes commercial breakthroughs 1. To create industry demand for science to commercialise 2. for community to celebrate success stories (commercial)"	Critical	Communication not just of academic success but commercial industry partnership social/public good success as well
Engagement with industry/other who can see the application of the science rather than science selling industry the ideas to commercialise.	High	Get industry 'in the room' when deciding on challenge solving
Disincentives to collaborate: dollars, values, transaction costs.	High/Med	Be creative on soil (?) for promotion etc.
Identify what the value chain is to be built on	NA	
Involve the value chain	NA	

### Institutional Representatives: SPACE AND SPATIAL SCIENCE

Mr Roger Franzen, ARRAY, Research School of Astronomy and Astrophysics, ANU

Prof Lisa Kewley, Research School of Astronomy & Astrophysics, ANU

Prof Matthew Colless, Research School of Astronomy & Astrophysics, ANU

Dr Christine Charles, Plasma Research Laboratory, Research School of Physics and Engineering, ANU

Dr Nick Robins, Research School of Physics and Engineering, ANU

Prof John Close, Research School of Physics and Engineering, ANU

Dr Paul Compston, Engineering Research School of Engineering, ANU

Prof John Sheehan, SIBA (Spatial Industries Business Association)

## CONCLUSION

In many places around the world the proximity that Canberra's research institutions and agencies enjoy is the product of a careful plan to work together and create a place of excellence. In Canberra the close proximity is simply the by-product of the growth of a new national capital rather than a plan to make our key institutions more effective and able to work together. The CSIP project has demonstrated that there is the motivation to change. It has also highlighted some areas of existing strength and detailed how collaboration could improve and expand upon these.

The Opportunity Areas presented in this report represent a spread of the possibilities that might be grasped. They sketch out the possible benefits of effective collaboration between the major research institutions in Canberra. However, although the Opportunities have links and numerous potential synergies, they cannot be all enacted simultaneously and picking the wrong opportunity area first could be a disaster.

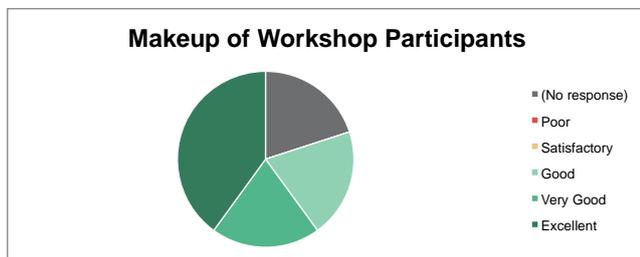
It is on the basis of an inspiring, ambitious challenge that real progress can be achieved and broader involvement can be built. The lead partners need to carefully consider their institutional strengths and goals and pick an attractive challenge that can produce an early win, prove the concept and establish an important precedent.

To echo the recommendations of the implementation workshop, ANU and the Canberra based parts of CSIRO need to lead the next steps. ANU and CSIRO have to commit to making collaboration a high priority or broader collaboration in Canberra will not happen. They need to commit the resources, agree upon a shared vision, and clearly define a big challenge area to focus on.

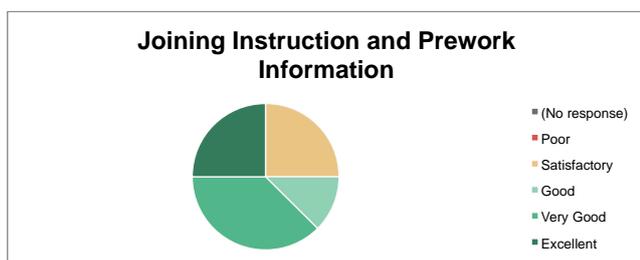
Having tested the waters, the challenge is now to maintain the positive momentum. As far as we can see here are no insurmountable roadblocks besides a need for organisational commitment. More than ever, there is a need for effective collaboration. Moreover, there are now distinct opportunities and competitive advantages to be gasped.

## WORKSHOP PARTICIPANT FEEDBACK

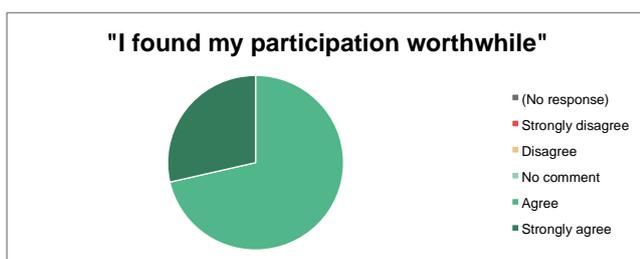
The implementation workshop was conducted in October 2014. The participants provided some detailed feedback on way that the workshop was run the quality of the experience and the manner of participation.



Participants judged that attendance of the Implementation workshop was good. There was a fairly balanced representation of the key institutions and relevant sectors.



There was some critical feedback around the explanations of the Opportunity Areas. In an effort to keep them broad and fairly undefined they became difficult to understand.



Participants who provided feedback considered that their participation was worthwhile.

### Implementation Workshop Participant List

Organisation	Title	First	Last
ACT Government	Mr	Ian	Cox
ANSTO	Mr	Mike	Siers
ANU	Prof	Margaret	Harding
ANU	Prof	Mick	Cardew-Hall
ANU Connect Ventures	Ms	Karen	Jackson
ANU Computer Science / NICTA	Prof	Pascal	Van Hentenryck
Australian Research Council (ARC)	Dr	Fiona	Cameron
Canberra Business Council	Mr	Tony	Henshaw
Canberra Innovation Network (CBRIN)	Dr	Sarah	Pearson
CSIRO	Dr	Dan	Walker
CSIRO	Ms	Kathy	Dunn
Department of Industry, Precincts	Ms	Shon	Fletcher
Economic Futures	Mr	Peter	Gordon
Lighthouse Innovation Centre	Ms	Anna	Pino
National ICT Australia (NICTA)	Dr	Phil	Robertson
R&D Commercialisation Adviser	Ms	Annemarie	Perret
University of Canberra (UC)	Prof	Frances	Shannon

