



Centre for eResearch and Digital Innovation
Annual Report 2015

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Foreword

Professor David Battersby, Vice-Chancellor



The Centre for eResearch and Digital Innovation (CeRDI) is focused on innovations in the use of advanced information and communication technologies (ICT) to build capacity in its partner organisations and to effect practice change through digital transformation in industry, government and academia.

The Centre continues to grow its research into the application of ICT and bring kudos to Federation University Australia.

In 2015, CeRDI received two Victorian Spatial Excellence Awards to add to its previous awards. One award was in the People and Community category for work in developing the Historic Urban Landscapes Ballarat / Visualising Ballarat portals in collaboration with the City of Ballarat; the second award was in the Environment and Sustainability category for outstanding work in establishing the Corangamite Soil Health Knowledge Base in collaboration with the Corangamite Catchment Management Authority. These awards highlight CeRDI's growing reputation in knowledge management and spatial systems as well as its engagement with industry and government.

CeRDI has continued its exemplary work towards two of the key objectives of the University's Strategic Plan: fostering world-class research; and being productive and effective in forming partnerships and engaging with its communities and regions.

Under the leadership of Associate Professor Helen Thompson, CeRDI is building expertise in eResearch and receiving international recognition. Visualising Victoria's Groundwater, a research project undertaken by CeRDI, has led to collaboration with the Open Geospatial Consortium on the development of international standards for groundwater information.

Long-term relationships with industry, government and academia continue to be developed. Examples of CeRDI projects highlighted in this year's Annual Report include further development of research in agriculture with the Grains Research and Development Corporation, in hazards planning with Victoria University and the Bushfire and Natural Hazards Cooperative Research Centre and work with the Gunaikurnai traditional owners on a knowledge hub to assist with joint management of parks and reserves.

CeRDI is well placed and strongly positioned to take advantage of opportunities with respect to digital disruption and digital transformations, which are rapidly becoming ubiquitous in research and driving innovation in the broader economy.

I acknowledge and thank Associate Professor Helen Thompson and the CeRDI staff for their continued contributions to the University and look forward to CeRDI's continued growth and success.

Introduction

Professor Leigh Sullivan,
Deputy Vice-Chancellor,
Research and Innovation



I am delighted to provide this introduction to the 2015 Annual Report for the Centre for eResearch and Digital Innovation (CeRDI).

CeRDI is one of Federation University Australia's leading research centres. Its engagement with external stakeholders and translation of research is promoting digital transformation and practice change across industry and government.

CeRDI's work was the basis for the case study submitted by FedUni to the Department of Education and Training *Review of Research Policy and Funding Arrangements*, which made recommendations on how to increase and improve collaborations and knowledge transfer between universities and business and other end users.

The Commonwealth Government's National Innovation and Science Agenda, announced in December 2015, highlights the need for increased engagement between universities and industry and other end users of research, in order to translate research into economic, social and other benefits for the nation.

The 2015 CeRDI Annual Report illustrates CeRDI's engagement and the diversity of research undertaken in collaboration with external partners. CeRDI's research areas include Agriculture, Natural Resource Management, Heritage and Culture, Hazards Planning and Resilience, Health and Wellbeing and Regional Development.

CeRDI's unique model of eResearch includes data discovery research, technological research and longitudinal impact research. Technology research is focused on data interoperability standards, spatial infrastructure systems, knowledge management systems and visualisation tools. *Making the Invisible Visible: The Impact of Federating Groundwater Data in Victoria, Australia* is the first of a series of impact publications with this paper published in the *Journal of Hydroinformatics*.

Other highlights in 2015 included CeRDI being recognised with 2015 Victorian Spatial Awards for the Corangamite Soil Health Knowledge Base and for Historic Urban Landscapes Ballarat / Visualising Ballarat. In collaboration with CSIRO and the Bureau of Meteorology, CeRDI received international recognition via the Open Geospatial Consortium for the development of international data standards for groundwater information exchange. Collaboration is now underway on the development of international standards for soil information.

CeRDI has continued to grow research capability by building its complement of research active staff and extending its Higher Degree by Research (HDR) program. In December 2015, six HDR students were being supervised or co-supervised by CeRDI researchers, with a further four HDR students to commence in 2016.

I congratulate CeRDI on its continued research successes which are demonstrated through activities profiled in the 2015 Annual Report.

Introduction

Associate Professor Helen Thompson, Director, CeRDI



2015 was a very productive year for CeRDI, with research growth across established and new partnerships. Grains Research and Development Corporation-related research projects included Diagnostic Agronomy, Grain and Graze, Online Farm Trials and Online Final Reports. With the Corangamite Catchment Management Authority the Natural Resource Management (NRM) Planning Portal developments advanced.

Climate adaptation research expanded through the Climate Ready adaptation and community engagement program in the Bayside City Council, Kingston City Council and Mornington Peninsula shire areas and the Southwest Climate Change portal.

The commencement of other projects further reflects the growing reputation that CeRDI has within the community and with our partners across industries. Examples include the Victoria University Bushfire and Natural Hazards Cooperative Research Centre economic geography, Historic Urban Landscapes (HUL) Ballarat and Visualising Ballarat research, Victorian Fire Risk Register, Victorian Volcanic Plains Linear Reserves project and the Gunaikurnai Online Information Hub.

Together, these examples highlight the diversity of our research capabilities across areas including agriculture, climate adaptation, emergency planning, health, heritage and culture, natural resource management and regional development.

During 2015 a program of impact research was initiated to provide insights into the uptake and application of digital technologies across relevant communities. Longitudinal research focused initially on the outcomes and impact of six major CeRDI research initiatives including Online Farm Trials and Visualising Victoria's Groundwater.

Staff numbers in the Centre continued to grow during 2015, with a focus on extending multidisciplinary capability and technical staff. CeRDI's Higher Degree by Research (HDR) program also expanded with funding secured for two PhD scholarships in collaboration with the Regional Universities Network Precision Agriculture Flagship and one PhD scholarship in collaboration with National ICT Australia (NICTA is merging with CSIRO's Digital Productivity flagship to form Data61).

CeRDI achievements were acknowledged with a number of prestigious awards during 2015. The Corangamite Soil Health Knowledge Base received the Victorian Spatial Excellence Award for Environment and Sustainability. HUL Ballarat and Visualising Ballarat received the Victorian Spatial Excellence Award for People and Community. CeRDI was a finalist in the 2015 Victorian International Education Awards industry partnership category. Sport and Recreation Spatial was also a finalist in the VicHealth Research into Action category.

For the Department of Education and Training *Review of Research Policy and Funding Arrangements*, FedUni selected CeRDI as the case study to submit to showcase research-industry collaboration. The success of the initiatives illustrated in the case study and the strength of their impacts is attributed largely to CeRDI's model of research and industry collaboration, which effectively aligns with industry needs and is collaborative across all research stages. Research impact measurement and long-term collaboration are central to CeRDI's research and research funding approaches.

In 2016, CeRDI will continue to build on spatial information and knowledge innovations to grow research income and discipline-focused research activities as evidenced by growth in HDR load, completions and publications. Greater linkages between CeRDI research and learning and teaching will also be established.



Overview

The Centre for eResearch and Digital Innovation (CeRDI) is located within the Office of the Deputy Vice Chancellor (Research and Innovation).

CeRDI focuses on multidisciplinary research in the application of advanced information and communications technology (ICT) to bring about digital transformations and practice change, together with enhancements in effectiveness and productivity in industry, government and academia.

CeRDI has a growing reputation for:

- the application of ICT and the development of innovative, world-class knowledge management systems;
- significantly advancing the digital literacy and knowledge management capabilities of partner organisations;
- fostering partnerships for the development and implementation of eResearch with industry, government and academia; and
- measuring the impact of eResearch and digital innovation through longitudinal research.

CeRDI is outcomes-focused – committed to building capacity and engagement with partner organisations and to ensuring the uptake of technologies benefits and supports research partners, their staff and stakeholders, including the broader community.


CeRDI delivers world-class innovations in technology by anticipating new technology directions and opportunities based on insights from research and partner engagement. These innovations generate beneficial partner outcomes and attract sustained research investment.

In 2015 the most significant advances have been linked to expanding CeRDI's engagement in spatial information systems, visualisation, knowledge management and data interoperability, and in impact research through commencement of a longitudinal research program that is exploring factors relating to project implementation and development, knowledge building, behaviour change and informed decision making.

Significant effort has been directed towards extending CeRDI's spatial technology capabilities through projects in agriculture, climate adaptation, emergency planning, health, heritage and culture, natural resource management and regional development.

CeRDI's research approach is characterised by the following attributes.

- **Partner engagement** – listening skills and the ability to translate information from partners into projects with outcomes that stakeholder's value. CeRDI has a reputation for consistency, reliability, timeliness, credibility and excellence.
- **Fostering long-term partnerships** – sustaining them beyond the period of initial grant funding (many partnerships continue for more than 10 years) and undertaking practical and applied research that deliver on outcomes.
- **A multidisciplinary team comprised of researchers with specific discipline expertise, technical and support staff** – an essential driver for innovation, knowledge and technology transfer.
- **A diverse portfolio** – stretching across a range of disciplines, with a multiplicity of organisations contributing to overall financial sustainability.
- **Prioritising a high level of co-creation** – through close linkages and engagement with staff from partner organisations including researchers, government, industry and community, which catalyses knowledge mobilisation and ensures beneficial outcomes for partner organisations.
- **Continuous innovation** – in knowledge management, publishing, spatial mapping and participatory geographical information systems.
- **A leader in eResearch and spatial innovation** – adding value to areas of FedUni research strength, aligned with the national eResearch framework and the National Science and Research Priorities.



CeRDI anticipates new technology directions and opportunities

CeRDI Team



A key priority continues to be to grow the research capacity of the Centre while maintaining skilled technical staff to support innovation and to meet the Centre's future research and technology goals and priorities.

In 2015, the CeRDI team of 31 (full-time; part-time; casual) comprised skilled and qualified staff across research (19), technical (9), and project management and administration (3). The Corporate Web Team were based in CeRDI for the first few months of 2015. Profiles for CeRDI staff are included in this report. Recent staffing appointments ensure there is greater support for senior research and technical members, enabling them to focus and advance their expertise and skills in new developments and build the Centre's research profile. CeRDI's increasingly multidisciplinary research capabilities distinguish it from traditional research centres and better ensure that the research undertaken has impact across a broad discipline base.

Research advancement and outputs are summarised in this publication. For the technical team, 2015 included an expanded focus on new spatial technologies across key projects. This required extensive technology platform developments.

CeRDI defines eResearch as a set of activities that harness the power of advanced information and communication technologies (ICTs) for research.

Characterised by collaboration and facilitated by fast, high-capacity networks, the range of eResearch activities is diverse and multi-disciplinary. Key themes and drivers of eResearch include:

- **data management and sharing;**
- **research collaboration;**
- **high performance computing; and**
- **customised discipline specific technologies to support research practices.**

eResearch methodologies and capabilities have applications across all research disciplines. As an enabler of innovations and new discoveries, eResearch has the potential to boost research effectiveness through increased interaction between researchers, increased access to data and enhanced access to research outputs.

CeRDI's specific expertise in eResearch is characterised by its innovations in knowledge management, spatial mapping, data interoperability and participatory geographic information systems. These have underpinned CeRDI's growth since 2012. For example, for the Visualising Victoria's Groundwater (VVG) project CeRDI developed spatial data infrastructure that federates groundwater data from disparate database sources into a single web portal.

CeRDI uniquely further defines eResearch as being comprised of three complementary directions:

- data discovery research;
- technological innovation research; and
- longitudinal impact research.

Data discovery research consists of two elements: the identification and analysis of research ready datasets (often historically hidden but once made accessible allow discipline-specific and cross-discipline research); and new discovery through crowd-sourcing and citizen science.



Technological innovation research at CeRDI includes the development of international open access standards, data interoperability methodologies and standards, data federation methodologies, three dimensional and four dimensional visualisation technologies, and digital tools to facilitate and support the development of crowd sourcing approaches and citizen science.

A key focus of the impact research is the measurement of shifts in knowledge, behaviour and attitudes within the practice context due to the technological innovation, and how these shifts have enhanced practice outcomes through informed decision making.

The eResearch methodologies developed by CeRDI are being applied across areas including agriculture, climate adaptation, emergency planning, health, heritage and culture, natural resource management and regional development.

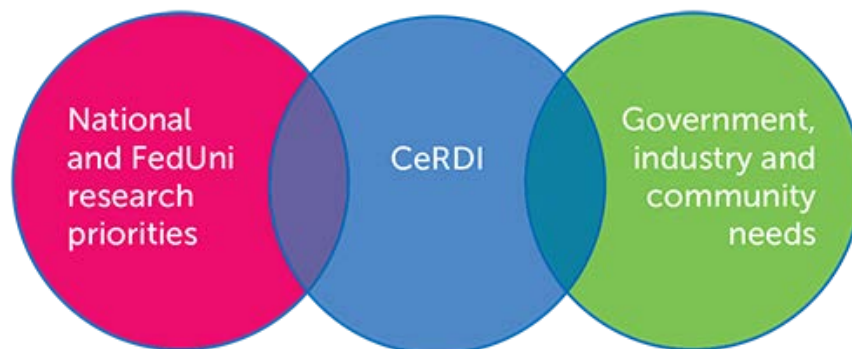
CeRDI's expertise in eResearch is coupled with a model of research that is characterised by the conceptualisation of discipline-specific investigations within the broader societal context – a dual function of all CeRDI research. The approach adopted by CeRDI researchers includes a social perspective to the impact of eResearch. This allows for insights relating to practice change, decision making, research potential and capacity building that have not previously been adopted consistently within the context of eResearch.

This approach places CeRDI in a unique position within the Australian eResearch environment.

CeRDI's Technological Approach

CeRDI capability

CeRDI applies eResearch and the development of innovative digital solutions to bridge the gap between academic research and government, industry and community needs.



The key principles underlying the spatial knowledge systems for CeRDI and FedUni are listed below.

- Ensuring end-user tools and applications are fast, intuitive and easy-to-use.
- Making sure that applications work seamlessly across a variety of platforms, operating systems and browsers to the extent possible.
- Use of open-source and standards compliant software and technologies, wherever possible.
- Building upon existing collaborative software initiatives and contributing enhancements/tools back to the community.
- Ensuring the flexibility of the developed system to consume data from a variety of sources so as not to interfere with existing provider work practices.
- Use of software based in the cloud: no end-user requirement for software, updates, computation power or plug-ins.

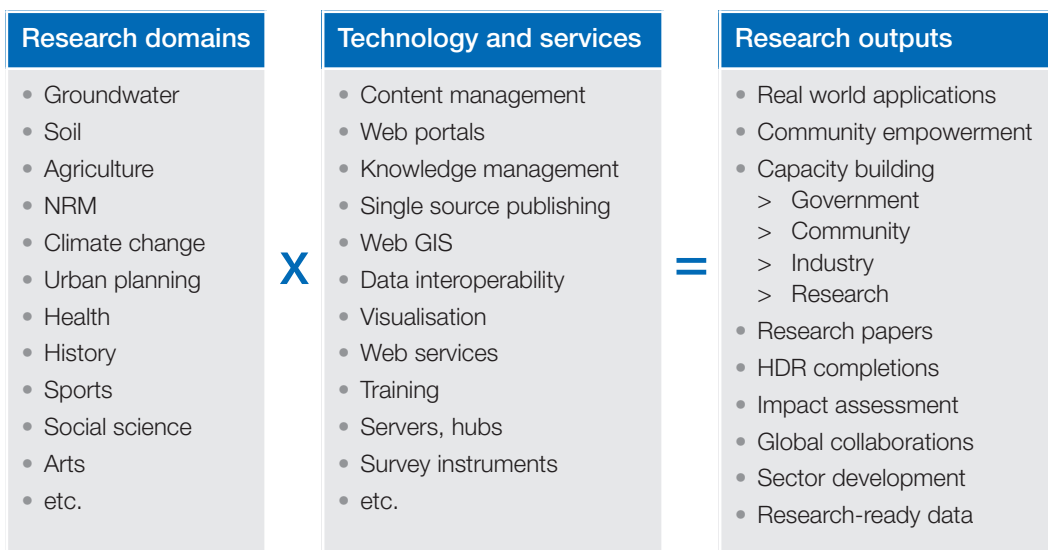
The CeRDI technical team adopts best practices for web development to ensure systems are responsive and accessible to the needs of users. The CeRDI technical team has extensive training and educational qualifications, capabilities and industry experience to ensure optimal project outputs, delivering scalable, and customised applications to meet the unique requirements of project partners.

CeRDI adopts an agile path for software and spatial knowledge systems development. Rapid prototypes of products are developed in conjunction with project partners, stakeholders and researchers to ensure their technical requirements are met at each development stage.

CeRDI capability: eResearch and digital innovation

CeRDI's capabilities in eResearch ensure full collaboration with research, industry and community partners to develop eResearch tools that:

1. interoperably integrate data (open data, research data, big data, sensor data, legacy data, crowdsourced data....any data);
2. allow the user to answer the frequently asked data/information questions;
3. dynamically generate conceptual and predictive (scenario) models;
4. make new discoveries and avoid repeating past research; and
5. measure the impact of eResearch on decision making and practice change.



Above: CeRDI's model of eResearch follows the classic definition of using information technology to support existing and new forms of research.

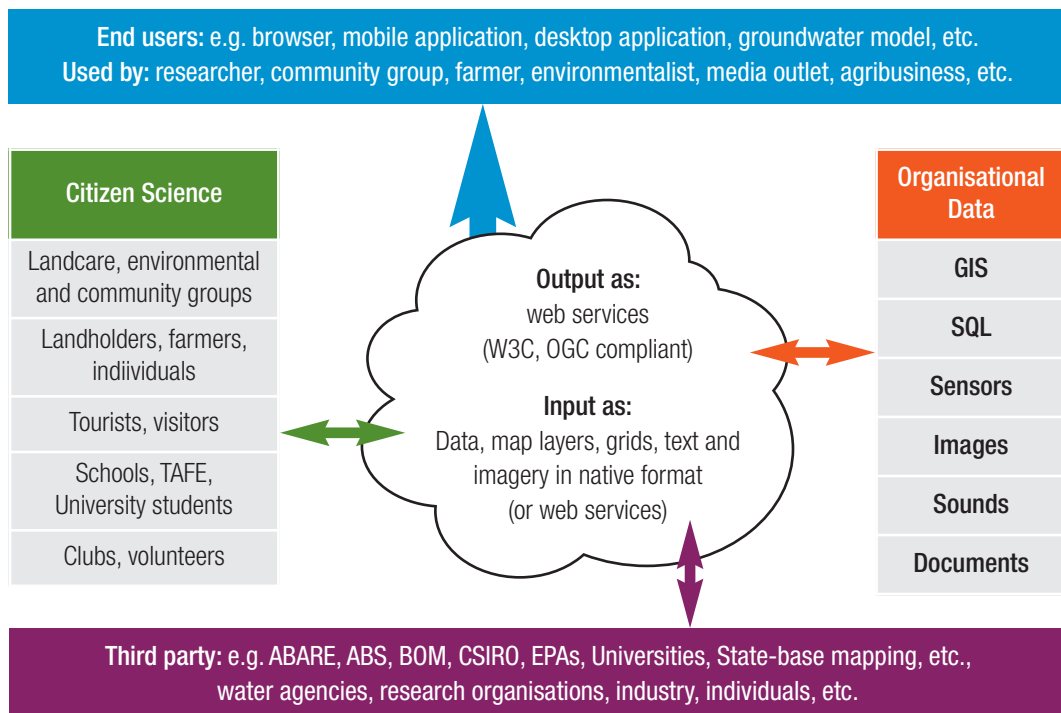
CeRDI capability: interoperability

The vast majority of CeRDI's eResearch is invested in the development of spatial data portals, as seen at: spatial.federation.edu.au.

For research investors, the portals address the increasing problems of the sheer range of information sources and volume of data that is now available (i.e. in the Era of Big Data). In Australia for example, information and data on agricultural soils is distributed via dozens of web-portals, web-based GIS tools, password protected portals, cloud storage, portable storage devices, hardcopy maps, theses, reports, newsletters, documents, videos and podcasts. Outside of the research community, this impressive resource of data, information and knowledge is largely ignored simply because most people do not have the knowledge, capability or desire to deal with the data deluge. Many people feel increasingly time poor and even though there is a plethora of data available, there is little opportunity or desire to undertake the research required to bring available information together in ways that best answer the questions that will guide future planning for sustainable and profitable use of agricultural soils.

To address these issues, spatial data infrastructure (SDI) has been developed and deployed to federate data from disparate database sources into a single web portal thereby making data more easily discoverable. Globally, the systems developed by Natural Resource Canada were the initial exemplars that were developed using open geospatial standards and technologies. Other examples include the European Commission's INSPIRE network, the New Zealand SMART system, and those developed by the United States Geological Survey, the French Bureau de Recherche Géologiques et Minières (BRGM), CSIRO and the Australian Bureau of Meteorology.

CeRDI actively collaborates with all these organisations by sharing open source technologies and developing open standards. Seamless international information exchange of complex domain data, such as groundwater or soil data, relies on agreed formats, communication protocols and schemas for serving, querying and consuming data, along with agreed content (known as semantic interoperability).



Above: The general conceptual model of the CeRDI spatial engine.



Case study: creating a new groundwater interoperability standard

The relative technical maturity of Open Geospatial Consortium (OGC) data access standards, such as the Web Feature Service (WFS) and Sensor Observation Service (SOS), combined with the rise of water data networks, created a need for an internationally agreed groundwater data exchange standard.

An international interoperability experiment to develop and test a standard for groundwater data exchange, was initiated by the OGC Hydrology Domain Working Group in 2012. The imperative for the development of the Groundwater Mark-up Language version 2 (GroundWaterML2) was the need to harmonise and advance existing groundwater data modelling initiatives, such as the Canadian-USA developed GroundWaterML1, the European Union INSPIRE geology/hydrogeology package, environmental monitoring facilities and area management/restriction/regulation zones and reporting units models, and the IUGS-CGI GeoSciML geology model. The intention is that GroundWaterML2 will be adopted as the authoritative international standard for the transfer of groundwater feature data, including data about water wells, aquifers/confining beds, groundwater fluids and related entities.

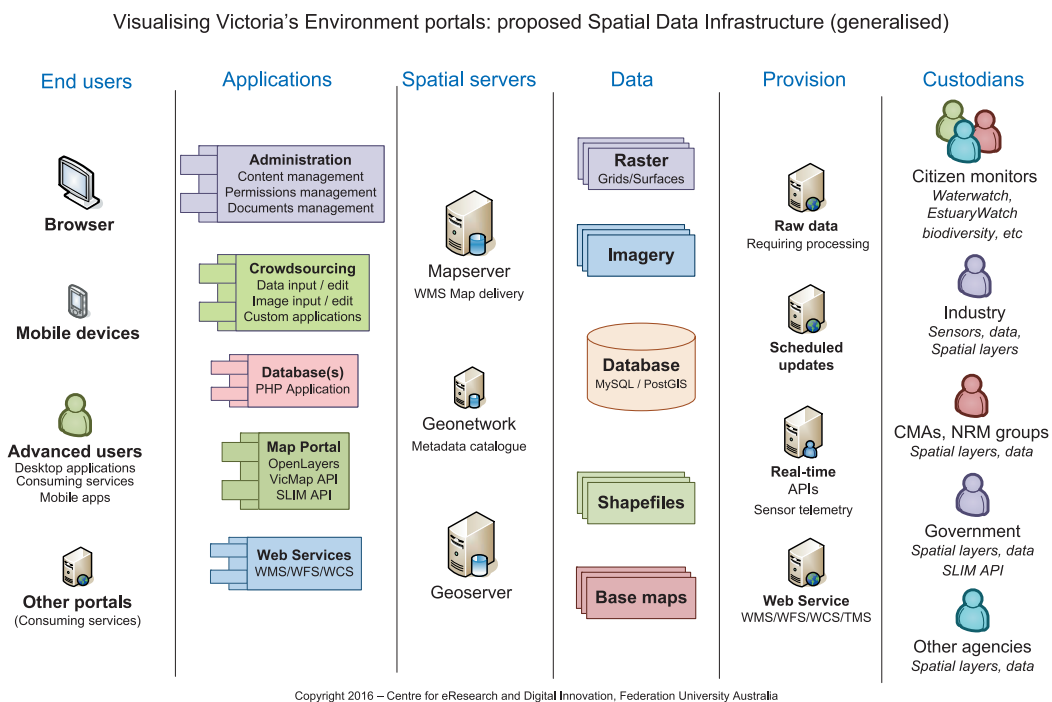
Five use-cases were employed in an interoperability experiment to test the proposed model. The collaborators in the interoperability experiment were the Geological Surveys of Canada, USA, Germany, UK, France and Poland, as well as the European Commission, CSIRO and the Bureau of Meteorology (Australia), the International Groundwater Resources Assessment Centre (UNESCO), University of Salzburg (Austria) and CeRDI.

The proposed GroundWaterML2 standard consists of three related objects: the conceptual model—a technology-neutral UML representation of the semantics of the groundwater domain; the logical model—a GML-specific schema that incorporates the OGC suite of standards; and the XML schema—an XML encoding of the logical model. The final GroundWaterML2 model will be officially launched at the OGC meeting in Dublin in mid June 2016.

CeRDI capability: systems architecture

The Spatial Data Infrastructure (SDI) deployed by CeRDI was initially developed by CSIRO and is known as the Spatial Information Services Stack (SISS). At the core of the SISS are the open source spatial data engines Mapserver (www.mapserver.org) and Geoserver (geoserver.org) which are used for the Geospatial processing and service delivery using Open Geospatial Consortium (www.opengeospatial.org) standards. Vector data are commonly stored within a MySQL or PostGIS database and raster data are dynamically processed from its native format. To deliver complex web feature services (WFS), the Geoserver app-schema extension has been deployed. Geonetwork (geonetwork-opensource.org) is used as the public-facing metadata catalogue for the portals.

The general systems architecture and data flows from Custodians to End Users is illustrated in the Figure below (taken from Dahlhaus & Thompson, 2016: Visualising Victoria's Environment: Collaborative development of online tools for State of Environment reporting. CeRDI Discussion paper prepared for the Office of the Commissioner for Environmental Sustainability, Victoria).



The key features of the systems are listed below.

- The data resides with the data managers (ensuring currency and validity)
- They are intuitive to use (similar to Google Maps)
- All forms of data are included (vector, raster, text and multimedia)
- Data downloads are allowed (subject to data custodian consent)
- Spatial data links to original source (documents and images)
- Spatial data links to real time data (data loggers, webcams)
- They are capable of analysing the interoperable data on the fly
- Interactive 3D visualisations can be created for user-selected scenes
- Users can add, edit or update data (subject to quality assurance and quality control)
- The spatial data and models are credible to the user

AGRICULTURE

Online Farm Trials

Online Farm Trials (OFT) research (www.farmtrials.com.au) is funded by the Grains Research and Development Corporation (GRDC) and applies digital technologies to provide access to a vast library of grains industry research for the first time.

The aim of OFT is to improve the productivity and sustainability of farming enterprises through enhanced access to farm trial research relevant to the grains industry. This is expected to lead to better use of past trial results and more rapid implementation of best practice farming approaches. OFT involves wide collaboration with industry and stakeholders across the grain growing regions of Australia with over 20 grower groups and organisations participating and contributing trial research.

OFT began in late 2013 as an initiative to develop a user friendly online resource for accessing information about grains research trials. It is assisting grain growers, agronomists, GRDC, government representatives and researchers, by providing effective access to trial and related climate, soil and natural resource information.

The CeRDI team is using innovative online technologies to enable access to this research through two online applications: the Trial Explorer and the Report Library. Key features include:

- online analytical tools for growers, agronomists and researchers;
- an online digital library of national farm trial research reports and supporting documents;
- direct online access to trial research data in digital form with download capacity;
- integration of regional, state and national climate and soil datasets;
- links to other sources of relevant trial research information; and
- increased networking and collaboration on cropping issues and on-farm trial research.

The OFT project marks a new era for the grains industry by unlocking data from farm trials research that has previously been largely hidden, accessible only via hard copy or basic electronic documents. With data now available online, there are new ways to access findings and discover information from cropping trials conducted across Australia. This presents opportunities for grain growers, agronomists, farming groups and researchers to improve industry practice in areas such as grains variety, soil, agronomy and growing techniques, taking into account climate information.

Industry consultants, including agronomy experts Cam Nicholson (Nicon Rural Services) and Rob Norton (International Plant Nutrition Institute), are providing specialist advice in relation to agronomists and grower information needs. This has been further informed by extensive stakeholder consultation with industry and grower groups across all GRDC regions with a focus on Western Australia, New South Wales, South Australia and Victoria.

Project Partners:

Grains Research and Development Corporation
Northern Growers Alliance
Grower Group Alliance
Victorian Grower Group Alliance
International Plant Nutrition Institute
Kondinin Group
Nicon Rural Services

During 2015, CeRDI Senior Research Fellow Dr Angela Murphy and colleagues commenced the first wave of impact research to explore factors relating to the impact of OFT on decision making, practice change, farm development and environmental management processes.

Data were collected from a range of stakeholders from across Australia, including grower groups, researchers and agriculture consultants. Key findings indicated strong and growing usage of the OFT. In interviews, stakeholders assessed OFT as a valued and necessary resource to support informed decision making in the grains sector. OFT was also assessed as having the potential for success because it uses localised agronomic data, encourages and supports end-user input, and, by using data sets that remain with their custodian groups, ensures that there is no loss of local relevance and ownership. The strengths of the OFT design identified by stakeholders included: ease of navigation; the search function; user friendly interface; speed of access, and the visual display and presentation.

The value attributed to OFT by those involved in the research is captured in statements such as:

We have really looked for a one-stop shop where you can go and really easily get an answer to a question you might have – I am really excited about what I can do with this because it is simple, a single place to pull out information that is relevant and it is pretty fast (as long as the internet is working) [interview participant: grower]

OFT is great. Simple, intuitive, well set up – a really great resource for professional agronomists. The filters make it easy to access information and make it available. Visually great for capturing attention [interview participant: growers group]

The impact research findings provide valuable insights for OFT. Further research will extend and consolidate these research findings. The second stage of a four-stage impact research program will commence in 2016.



For more information about OFT see
www.farmtrials.com.au

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AGRICULTURE

Grain and Graze 3 and the Agriculture Price Guide Tool

Grain and Graze 3 is the third phase of a long-term farming program to support farmers manage the complexities of mixed farming enterprises such as livestock and cropping across the many different climates and environments of the Australian continent.

Grain and Graze commenced nationally in 2003 as a collaboration between four core agriculture industry organisations: the Australian Wool Innovation, Meat and Livestock Australia, Land and Water Australia and the Grains Research and Development Corporation. The aim of the project is to identify national solutions to issues of production and management associated with mixed farming. Since its beginning, the project has led to considerable advances in the understanding of grazing crops, how to integrate livestock and cropping on farms and the management challenges and risks of operating a complex farming system.

The recent iteration of the project – Grain and Graze 3 – aims to extend current knowledge by enhancing grower ability to profitably and sustainably integrate crops and livestock and to operate a flexible, responsive farming business across three core areas including:

- better grazing of cropped land to maximise profit while minimising risk within seasons;
- improvements to crop and pasture rotations across seasons to benefit livestock and control emerging issues with weeds, losses in organic matter, nitrogen and soil structure; and
- enhancing decision making to achieve the business and personal outcomes a farmer wants.

CeRDI, in close collaboration with Nicon Rural Services, has been integral to the development of the Grain and Graze 3 online services. Core aspects include access to research reports and publications, fact sheets, calculators, tools and case studies. Another key feature that is valued by farmers and scientists alike is the archive of historical data, providing information about past mixed farming practices and decision making.

The Agriculture Price Guide has been developed as a web-based tool that enables farmers and advisors to examine historic weekly prices for major agricultural commodities. Created as part of the risk and decision making theme of Grain and Graze, this tool assists in understanding historic prices and price fluctuations at various locations across southern and Western Australia.

Previously, access and interpretation of commodity sales data required manual collation and processing of multiple source datasets to produce customised one-off reports. This process was repeated every time a release of updated sales data occurred or when new versions of the report are needed. With the development of the Agriculture Price Guide tool, users can now access the aggregated sales data in one online location and produce customised graphical and tabulated reports on demand through an interactive user interface.



Project Partners:

Nicon Rural Services

Grains Research and Development Corporation

Information is presented through a selection of graphs, statistical tables (mean, deciles) and correlations, adjustable for inflation. Information is updated annually in September for the previous end of financial year data (June).



Grain and Graze 3 and associated online tools such as the Agriculture Price Guide provide farmers with a national resource in which access to past and current information across core farming themes is delivered through an innovative digital platform. This information may assist in problem-solving complex farming issues and lead to developments and innovation for improved farming practices.

In commenting on the Grain and Graze 3 website, Director of Nicon Rural Services Mr Cam Nicholson said: *“The Grain and Graze 3 website, together with the Ag Price Guide, provide an invaluable repository of information that is helping to transform current and future industry practices for Australia’s mixed farming businesses.”*

For more information about Grain and Graze 3, see www.grainandgraze3.com.au

For more information about the Agricultural Price Guide see www.grainandgraze3.com.au/cb_pages/gg3_Tools_and_calculators.php

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AGRICULTURE

Electronic National Vendor Declarations in Victoria's Livestock Industry

A 'proof of concept' trial with implementation strategies for the uptake of new technologies within the livestock industry was successfully completed in Victoria in 2015 with electronic National Vendor Declaration forms across the livestock supply chain.

The National Vendor Declaration (NVD) forms document the movement of livestock between locations, requiring producers to share important information about livestock history and compliance. These forms are essential for upholding Australia's food safety reputation for meat and livestock. Until the commencement of this project only hard copy versions of national vendor declaration forms were available.

The trialling of a range of software and hardware solutions to create an electronic NVD (eNVD) at the farm gate addresses some of the practical limitations associated with hard copy forms, and enables a range of new technologies and technology devices (including tablets and smart phones) to be trialled to enhance the digital capability of the NVD system across the livestock marketing chain.

Since its commencement in early 2014, interest in the project has grown with substantial support received from the livestock industry. The lead partner on the project, Livestock Saleyard Association of Victoria (LSAV), together with Dairy Industry Victoria, has drawn together partners including CeRDI, the Victorian Government, the Victorian Farmers Federation, Midfield Meats, and key livestock industry representatives including farmers, livestock agents and transporters and saleyard representatives.

With its expertise in eResearch and innovation, CeRDI contributed to this project as a member of the steering group, offering advice relating to the technology platforms, and coordinating tender and contracting processes for the project. CeRDI also provided the project management and evaluation support to this project.

Four technology organisations were involved in the development of various solutions, including Sapien Technology, Livestock Exchange, Triton (partnering with Litams Aus) and Thorsys Australia. The resulting technology products enabled a range of trials to be undertaken across the livestock supply chain to allow comprehensive testing of various digital options for generating eNVDs from the start of the supply chain (at the farm gate) and across the supply chain, including at saleyards and at processing systems.

During the trial, feedback was sought from producers, saleyard managers, agents, processors and transporters. Findings indicate that there are benefits associated with the introduction of an electronic system for NVDs that include major time savings, and increases in accuracy and timeliness. One of the recommendations from the project was for a phased rollout of a national system in which significant resources are provided to support the industry to adopt eNVDs that would involve comprehensive training and support for the industry, sector-wide.



Project Partners:

Livestock Saleyard Association of Victoria

Dairy Industry Victoria

Victorian Government

Victorian Farmers Federation

Midfield Meats

The outcomes of this project were shared with industry representatives and were well received. The media attention following this event prompted calls from leading industry organisations for the swift introduction of a national eNVD system. The learnings from this pilot project have generated a commitment between project partners and Meat and Livestock Association for a national project. The goal is to progress towards a national system of eNVDs under the guidance of the SAFEMEAT review Committee.

Funding for this project and trial was made available through the Victorian Government's Digital Futures Fund.



Key Contact

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NATURAL RESOURCE MANAGEMENT

Corangamite Soil Health Knowledge Base

In 2015, CeRDI was recognised for its spatial technology expertise and the development of the Corangamite Soil Health Knowledge Base by receiving a Victorian Spatial Excellence Award 2015 in the Environment and Sustainability category. Partners on the project include the Corangamite Catchment Management Authority (CMA) and Corangamite CMA Land Health Program Steering Committee.

The Corangamite Soil Health Knowledge Base offers essential background information and knowledge required to implement the South West Agricultural Soils Plan across 15 landscape zones in the Corangamite region. The Corangamite Soil Health Knowledge Base has established a comprehensive knowledge base of soil health information that is assisting the broader community implement local catchment plans across the Corangamite region.

Through this project a repository of soil health knowledge is readily available to the community in a way that makes it informative, relevant and useful to the needs of land managers. It includes reports, research papers, maps, soil profile descriptions, soil test data, digital soil maps, land capability maps, geohazard maps, hazard susceptibility maps, images and other resources.

The Soil Health Knowledge Base comprises two main components: an eLibrary of digital documents, webpages, images and multimedia that is easily searchable; and an interactive map portal to discover spatial soil data. The map portal is based on spatial data infrastructure (SDI) that has been developed and deployed to federate soils data from disparate database sources into a single web portal thereby making data more easily discoverable. Where possible, the portal offers real-time access to remote authoritative databases by integrating the interoperable web services they each provide. In cases where the data already exists in other web locations, linked data technologies are used to connect to that remote resource.

Many of the datasets used have been sourced from legacy information held by government agencies, such as the former Victorian Soil Conservation Authority and Department of Agriculture. More modern data is available via web services, such as landscape-water data from Geoscience Australia and the CSIRO Soil and Landscape Grid of Australia. In addition, community-contributed soil data is included in the form of more than a hundred farm soil test data locations that may eventually provide a time-series of soil health indicators. Academic research data is also included, such as fine resolution digital soil maps from a recently completed PhD research project.



Project Partners:

Corangamite Catchment Management Authority (CCMA)

CCMA Land Health Program Steering Committee



Victorian Spatial Excellence Award 2015. From left: CeRDI staff members Andrew MacLeod and Rob Milne, together with George Havakis (SIBA Chair), Bret Ryan (Land Health Manager Corangamite CMA) and Gavan Mathieson (Community Engagement and Investment, Corangamite CMA).

Although some data are consumed via interoperable services, there are a number of datasets hosted and delivered by the Soil Health Knowledge Base. Spatial data engines Mapserver (www.mapserver.org) and Geoserver (geoserver.org) are used for the Geospatial processing and service delivery using Open Geospatial Consortium (www.opengeospatial.org) standards. Vector data is commonly stored within a MySQL or PostGIS database and raster data is dynamically processed from its native format.

Further information about Soil Health visit:

www.ccmaknowledgebase.vic.gov.au/soilhealth

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NATURAL RESOURCE MANAGEMENT

Gunaikurnai Online Information Hub

CeRDI recently entered into an arrangement to establish the Gunaikurnai Information Hub. The project is a collaboration with the Gunaikurnai Traditional Owner Land Management Board, Gunaikurnai Land and Waters Aboriginal Corporation and FedUni Gippsland.

The Gunaikurnai Information Hub will provide support for the joint management of parks and reserves, with traditional owners playing a central role in managing these lands into the future.

CeRDI's role is to develop and deliver an Information Hub to facilitate information-sharing relevant to the development and implementation of joint management of the Appointed Lands. CeRDI's innovative eResearch technologies and practices will be applied to empower knowledge custodians with the capability to share their information and/or data in the same virtual space without losing custodianship or ownership of the information.

With input on the project from stakeholders, these technologies and tools will seamlessly link information from Parks Victoria, Department of Environment, Land, Water and Planning (DELWP), Aboriginal Affairs Victoria, the Bureau of Meteorology, GeoScience Australia, Australian Bureau of Statistics (ABS) and other relevant information sources.

Other FedUni researchers involved in this project include Associate Professor Fred Cahir and Sarah McMaster who are contributing through the preparation of a literature review and report on the Gunaikurnai traditional ecological knowledge of fire.

It is anticipated that the Gunaikurnai Information Hub will inspire and encourage the broadest possible stakeholder participation and provide a platform for information dissemination and engagement across the community.

Research will be conducted alongside this project to explore the impact of the hub on decision making and practice change.

Project Partners: Gunaikurnai Traditional Owner Land Management Board;
Gunaikurnai Land and Waters Aboriginal Corporation



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Leadbeater's Possum Interactive Map

A partnership between DELWP and CeRDI has led to the development of an interactive spatial map focused on the endangered Leadbeater's possum.

The Leadbeater's possum is Victoria's faunal emblem. It is found only in this State, inhabiting some forested regions in Victoria's central highlands as well as small regional pockets to the north and east of Melbourne. This species of possum is critically endangered and, although new sightings of the possum have recently been recorded, Leadbeater's possum colonies are still under threat from habitat modification.

Efforts to halt the decline of the species have resulted in a range of State Government initiatives, including spatial mapping of possum colonies across Victoria. In collaboration with staff at DELWP, CeRDI has developed the web-based interactive map of the Leadbeater's possum, thus enabling access to the most current, location-specific data of all known colonies.

The Leadbeater's Possum Interactive Map, which is accessible to the general public, provides a gateway to key information that has the potential to support species conservation activities and environmental management and planning for specific colonies across the state.

The data available provide location-specific details of all pre-existing (since 1998) and new possum colonies. The range of mapping options provides greater insights about the location of colonies in relation to

important landmarks, infrastructure and the environmental landscape.

The Leadbeater's Possum Interactive Map consolidates and extends CeRDI's considerable expertise in using spatial technologies and developing interactive maps and associated tools for environmental planning and natural resource management.

The Victorian Commissioner for Environmental Sustainability, Dr Gillian Sparkes, commented that the new interactive map was an example of using digital platforms to encourage citizens to engage in science. *"I would encourage those interested in protecting the precious Leadbeater's possum to log-in and keep informed on how efforts to protect Leadbeater's possum are progressing"* Dr Sparkes said.



Project Partners: Department of Environment, Land, Water and Planning

For more information about the Leadbeater's Possum Interactive Map visit DELWP:

www.delwp.vic.gov.au/environment-and-wildlife/conserving-threatened-species-and-communities/leadbeaters-possum

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NATURAL RESOURCE MANAGEMENT

SWIFFT and Visualising Victoria's Biodiversity

The State Wide Integrated Flora and Fauna Teams (SWIFFT) is an initiative supported by CeRDI and DELWP to advance citizen science by facilitating awareness and knowledge sharing in relation to biodiversity conservation and threatened species for Victoria.

CeRDI has received funding from the Helen Macpherson Smith Trust to engage with biodiversity stakeholders and enhance planning. Funding will also advance activities associated with the Visualising Victoria's Biodiversity interoperable knowledge management portal.

This project will be completed in 2016.



Project Partners:

Victorian Department of Environment, Land, Water and Planning

Helen McPherson Smith Trust

Key Contact

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Wildlife Survey Open Data Collections

A collaborative data project undertaken by CeRDI and the FedUni Library has seen the launch of two new data sets for public access. The project, funded by the Australian National Data Service (ANDS), was designed to provide open access to FedUni research data that comprises important wildlife survey data.

It is anticipated that the discoverability of these two datasets will raise the profile of the University and will enable increased citations of both the research data and outputs via Google harvesting of FedUni Research Online records. In addition, the datasets will be available for other researchers and organisations to review. It is hoped that this will encourage further external interest that may lead to new research collaborations and opportunities.

This project provided an opportunity to work with FedUni researchers from Gippsland to raise knowledge of visualisation and spatial mapping technologies. The launch of the wildlife survey datasets followed the showcasing of ANDS projects in Canberra at a national celebration of the Open Data Projects on 19 June 2015.

The datasets can be accessed at:

http://data.cerdi.edu.au/gippsland_birds.php

<http://data.cerdi.edu.au/ljvbs>



Project Partners:

Australian National Data Service Open Data Collections

FedUni Library

FedUni School of Applied and Biomedical Sciences



For more information about ANDS projects, visit: www.ands.org.au/partners-and-communities/open-research-data-collection

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NATURAL RESOURCE MANAGEMENT

Visualising Victoria's Groundwater

Visualising Victoria's Groundwater (VVG) provides a central site for accessing Victoria's ground water information. VVG consolidates data from over 400,000 bores from four authoritative sources together with Victorian aquifer information with features that include 2D and 3D visualisations, hydrogeological models and historical records and maps.

VVG is the first of its kind in Australia to offer real-time visualisation of a resource normally invisible to the public. Until the project's commencement, information about Victoria's groundwater data was difficult to locate and was stored in various databases, with only a fraction of the information available online.

Victoria's groundwater data are maintained across the different databases by various authorities and organisations. CeRDI has employed its expertise in interoperable technologies and high speed broadband to capture, aggregate and spatially depict Victoria's groundwater systems into one comprehensive and publically accessible web portal. This ease of access and exploration of Victoria's groundwater data means that VVG has been readily adopted by water users, resource managers, landowners and conservation groups to inform their decisions about managing consumptive water use and environmental water flows.

This unique project has drawn significant interest from local, state, national and international organisations with 15 research institutions, government bodies and businesses collaborating on the project (see 'Project Partners'). These partnerships have enabled the project to be supported and to achieve outcomes well beyond the project's original scope.

During 2015, CeRDI commenced the first wave of longitudinal research to explore factors relating to project implementation and development, and the impact of VVG on decision making and practice change.

Findings to date indicate a steady and consistent increase in the usage of VVG since its establishment. Research identified the following features of VVG are most valued by users and support ongoing use of the portal as a mechanism for informed decision making: the ease of use of the portal; the quality of the data contained in the portal (and resultant corresponding high level of trust in the data); the level of end-user control over data access; and the single point of access provided by VVG. This feedback reinforces the strengths of VVG as an interoperable resource with a single point of access allowing users to readily explore groundwater issues or the questions over time.

Research participants confirmed productivity and efficiency gains through decreased time in data sourcing and processing, and in responding to inquiries. They also identified benefits in consolidating, combining and comparing data from multiple sources to identify gaps and emerging issues.

The second stage of the four-stage research program will commence in 2016.

Project Partners:

Federation University Australia

Victorian Government Department of Economic
Development, Jobs, Transport and Resources

Australian National University (Integrated
Catchment Assessment and Management
Centre)

Southern Rural Water

CSIRO

Goulburn Murray Water

Thiess Services Pty Ltd

Queensland University of Technology

Natural Resources Canada

Geological Survey of Victoria

Senversa Pty Ltd

Cooperative Research Centre for Spatial
Information



For more information about Visualising Victoria's Groundwater see www.vvg.org.au

Key Contact

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About the VVG research: Dr Angela Murphy, CeRDI Senior Research Fellow:
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NATURAL RESOURCE MANAGEMENT

Land Your Career

Land Your Career is part of a larger project – the Integrated Land Management Curriculum for Victoria (ILMCV) – which involves a unique teaching and training partnership between six tertiary education providers across 18 locations in Victoria’s west.

Land Your Career is a comprehensive portal with information about land management careers covering a broad range of themes that include water, fire, natural environments, restoring landscapes, forestry, conservation, cultural heritage, biodiversity, sustainability, parks/reserves and landscape/building design. It provides school leavers, careers teachers and mature age students accurate information about pathways and qualifications required for specific land management careers. The portal was developed by CeRDI with FedUni’s Faculty of Science and Technology a consortium partner on the project.

This project aims to significantly enhance opportunities for regional, rural and remote students to participate in higher education through increased collaboration and co-operation between institutes in the regionally vital discipline of land management.

The ILMCV addresses the issue of the lack of regional access to higher education through the development and incorporation of flexible program design, delivery and support, increased pathway options for students and better articulation between courses and course providers across the west of Victoria. The consortium includes: The University of Melbourne, Federation University Australia, Bendigo TAFE, Sunraysia Institute of TAFE, Timber Training Creswick and South West Institute of TAFE.

The ILMCV also aims to increase the networking capacity across these institutions, embed industry relevance into more levels of courses, offer teaching staff across the region professional development opportunities, and contribute to a stronger and more productive network which can leverage enhanced industry and community interactions. ILMCV brings together stakeholders from education, industry and the community to provide advice on the development of new education programs to support existing and emerging industries. It also acts as a demonstration project that can be applied to other sectors, regions and education providers, providing a template for cross-institutional teaching and learning models.

Land Your Career is used to educate and inspire prospective students on the careers and roles that exist in the land management sector. Information on how prospective students can become qualified or build qualifications in this exciting area has been developed and is being disseminated online and through traditional communications approaches.

The establishment of the ILMCV was funded by the Department of Education and Training through the Regional Partnership Facilitation Fund.



Project Partners:

Bendigo TAFE
FedUni Faculty of Science and Technology
South West Institute of TAFE
Sunraysia Institute of TAFE
The University of Melbourne
Timber Training Creswick



For more information about Land Your Career see <http://landyourcareer.edu.au/>

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HAZARDS PLANNING AND RESILIENCE

Climate Ready

The Climate Ready project was designed to provide residents, businesses and holiday home owners in the bayside councils of South Eastern Melbourne with a better understanding of the likely impacts and risks of climate change.

CeRDI has worked extensively on Climate Ready since June 2014, and the project has involved significant community engagement (surveys and focus groups) to inform development of comprehensive online resources and tools.

A unique feature of the project is a website that also includes a Climate Ready Action Plan which allows users to identify their own local climate change risks and create personalised action plans. Climate Ready will provide a 'one-stop shop' for easy access to information about preparing for heatwaves, bushfire, drought, flooding, and severe storms. It will assist individuals, families and the community to better prepare for the risks of climate change.

Funded by the Victorian State Government's Victorian Adaptation and Sustainability Partnership program, Climate Ready will be completed and launched in early 2016.



Project Partners:

Bayside City Council
Kingston City Council
Mornington Peninsula Shire
Victorian Department of Environment, Land,
Water and Planning

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Mapping and Understanding Bushfire and Natural Hazard Vulnerability

The Victoria Institute of Strategic Economic Studies at Victoria University is undertaking research for the Bushfire and Natural Hazards Cooperative Research Centre (CRC).

CeRDI has partnered in this research to build an economic geography from spatial data linked to a range of economic, social and environmental values and natural hazards data, creating maps of values at risk.

The initial focus of the project was bushfire and natural hazard vulnerability in Victoria, but as the project evolves, it is expected that this will be expanded nationally.



Project Partners:

Bushfire and Natural Hazards CRC

Victoria Institute of Strategic Economic Studies, Victoria University



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HAZARDS PLANNING AND RESILIENCE

Victorian Fire Risk Register

Online services to assist stakeholders to assess the risk of bushfires to public assets across Victoria's non-metropolitan municipalities were launched in 2015. The Victorian Fire Risk Register-Bushfire (VFRR-B) was commissioned and undertaken in close consultation with the project funding body, the Victorian Country Fire Authority.

The key objectives of the VFRR-B were to identify areas across Victoria that are at risk of bushfires, to facilitate improvements in bushfire management planning through the availability of evidence-based data, and to enable risk assessment of public assets. The public assets datasets available through the register include a range of human settlement, cultural heritage, economic and environmental assets that are both public and privately owned.

The VFRR-B online services were developed following consultation with key stakeholders and in consideration of the step-by-step processes to facilitate access to primary and secondary (supplementary) information. A range of advanced technologies were incorporated to ensure a robust platform for the efficient distribution of content and data. Concurrently, a user-friendly and intuitive interface has been prepared to ensure stakeholders can quickly access the required data. Data custodians can also provide updates to the asset information and key data which is then uploaded on the register at regular intervals, thus ensuring the currency of information.

In addition, the register offers web-GIS capabilities, thus enabling users to access maps with customised layers for the integration of datasets. This provides enhanced interaction for users via the mapping of data specific to their region. The VFRR-B is available for access by representative organisations including local government, fire services, public land managers, utilities and community groups. These organisations have responsibility for identifying areas of risk from bushfire and to assess that level of risk for each asset. All non-metropolitan municipalities are represented in the register and are required to conduct bushfire risk assessments.



The data available on the VFRR-B is also being used by agencies to complement their bushfire planning and to support their decision making.

Project Partners: Victorian Country Fire Authority



The register is available at www.vfrr.vic.gov.au

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DIGITAL CAPACITY

DigiBiz

Co-ordinated by CeRDI, the Central Highlands Digital Enterprise project (DigiBiz) project has provided businesses and not-for-profit organisations in local municipalities in the Central Highlands region of Victoria with the opportunity to learn more about harnessing the potential opportunities of new broadband technologies.

Launched in July 2012, DigiBiz offers training and provides mentoring and advice to small-to-medium enterprises, not-for-profit organisations and local cultural institutions about the latest broadband technologies. Additional approaches to build awareness and participation in the project also included establishing networks across local communities, 'training the trainer', identifying network champions and facilitating forums by prominent Australians and broadband champions.

The DigiBiz project received funding of approximately \$1 million from the Commonwealth Government's Department of Communications, together with funds from Regional Development Australia – Grampians as well as significant in-kind contributions from local government partners: City of Ballarat, Golden Plains Shire Council, Hepburn Shire Council and Pyrenees Shire Council.

Since its launch the DigiBiz program has delivered workshops and mentoring activities to over 3,000 participants representing a range of business and community organisations; the training activities were aimed at increasing the digital literacy levels of participants.

During 2015, research was undertaken to assess the impact of this program on skills development for program participants. Feedback for this research was captured from over 100 program participants and nine program mentors and workshop facilitators. The research demonstrated that workshops and mentoring were successful in broadening participants' internet use within their businesses and organisations.

Over two-thirds of the participants commented that the learnings from the DigiBiz program had impacted positively on them and/or their organisation. Workshop participants reported an increase in skills development, awareness and understanding across a range of online applications. Participants of mentoring reported that the program had led to an increased understanding and knowledge as well as changes in practices with using online and latest technologies. These results confirm that DigiBiz is an important, regionally-implemented program that is widely valued by program participants and mentors alike. The resources developed through the DigiBiz program (including access to a pool of program experts and mentors) provide the foundation for expansion of the program to other regions in the future.



Project Partners:

Commonwealth Government Department of Communications

Regional Development Australia – Grampians

City of Ballarat

Golden Plains Shire Council

Hepburn Shire Council

Pyrenees Shire Council



For further information about DigiBiz, visit:
www.digibiz.net.au

Key Contact

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For information about the DigiBiz research:
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DIGITAL CAPACITY

Great South Coast Digital Strategy

CeRDI and Lateral Plains have been contracted by Regional Development Australia Barwon South West Committee to conduct research to inform the development of a digital strategy for the Great South Coast region. The region includes the local government areas of Colac Otway Shire, Corangamite Shire, Glenelg Shire, Moyne Shire, Southern Grampians Shire and Warrnambool City Council.

The aim of the research, which commenced in 2015, is to determine regional business uptake of digital solutions that enhance productivity and profit, level of digital maturity in businesses and exemplar businesses that are contributing, or have the potential to contribute, to the growth of the region's economy. Businesses across the region will be invited to participate in this research and to share information about their level of technology adoption and engagement with digital technologies. The research will also comprise in-depth interviews with leaders from innovative businesses from a cross-section of the regional economy. This will provide the basis for developing case studies of best practice in digital adoption, thus highlighting the achievements of businesses in implementing digital initiatives in their region.

This research builds on the Great South Coast Regional Communication Strategy developed for the region by CeRDI and Lateral Plains in 2011. The data captured from residents and businesses in the 2011 strategy will be used for comparison in the present project.

The new research will answer important questions about the uptake of digital technologies by businesses in the Great South Coast and identify barriers and facilitators to the adoption of these technologies. As an outcome, strategies will be identified to facilitate the increased adoption of digital technologies across the region.

With the widespread delivery of the national broadband network across Australia, including the Great South Coast region, the findings from the research will inform development of the digital economy, leading to a more robust community that is fully engaged within the local, national and international economy.

This project will be completed in 2016.



Project Partners:

Lateral Plains

Regional Development Australia Barwon
South West Committee

Colac Otway Shire Council

Corangamite Shire Council

Moyne Shire Council

Warrnambool City Council

Glenelg Shire Council

Southern Grampians Shire Council



Key Contact

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HEALTH AND WELLBEING

Central Highlands Health Justice Partnership for Youth

The Central Highlands Health Justice Partnership for Youth is delivering an integrated health justice service to improve the legal, health and wellbeing outcomes for disadvantaged young people.

The program commenced operation in February 2015, led by CeRDI in collaboration with Ballarat Community Health and Central Highlands Community Legal Centre, and funded by a major grant from the Victorian Legal Services Board.

In Victoria – especially in rural and regional areas – there is a high incidence of young people with mental health, drug and alcohol issues experiencing multiple legal problems. The Health Justice Partnership for Youth has been established through an alliance between local health agencies and legal organisations to integrate vital legal services within healthcare programs for at-risk youth.

The Central Highlands Health Justice Partnership for Youth provides early intervention by delivering an integrated medical and legal service, with a lawyer from Central Highlands Community Legal Service based at Ballarat Community Health

Facilitating early intervention and raising awareness of the impact of legal issues on health and well-being for the region's youth is a key objective of the program. Dr Margaret Camilleri, lead researcher for the project, commented, *'Many young people experience a range of legal problems across civil, criminal and family law areas. These are frequently ignored and have short and long term impacts on mental health and well-being. The Health Justice Partnership for Youth is designed to increase awareness and promote early intervention of the available legal assistance for local young people within the community health setting'*.

Ballarat Community Health is a convenient, trusted, and safe environment. Co-locating legal services at this location has the potential to facilitate the early identification and management of legal issues for young people. The goal is also to enhance agency staff knowledge and skills development in understanding and responding to the legal issues of young people.

Research is being conducted alongside the Central Highlands Health Justice Partnership for Youth to measure impacts and outcomes for young people, Ballarat Community Health staff and program partners. This research will provide further understanding about health justice partnerships within the Australian context and offer new insights to support the delivery of ongoing services for at-risk youth in our region.



Launch of the Central Highlands Health Justice Partnership for Youth. From left: Associate Professor Marie Bismark (Law and Public Health Group, University of Melbourne), Dr Margaret Camilleri (CeRDI), Ms Lisa Buckland (Central Highlands Community Legal Centre) and CeRDI Director, Associate Professor Helen Thompson.

Project Partners:

Ballarat Community Health
Central Highlands Community Legal Centre
Victorian Legal Services Board

Key Contact

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HEALTH AND WELLBEING

Dementia Pathways Tool for South Eastern Melbourne

The South Eastern Melbourne Dementia Pathways Tool provides general practitioners and practice nurses with online information, resources and local contact information to assist with the diagnosis, early intervention and management of patients with dementia.

Launched in early 2015, this Dementia Pathways Tool enhances and extends similar services established in 2013 for health practitioners in the Grampians region.

To support this extension CeRDI redeveloped the Dementia Pathways Tool so it could comprise core dementia content, and content contextualised to local regions.

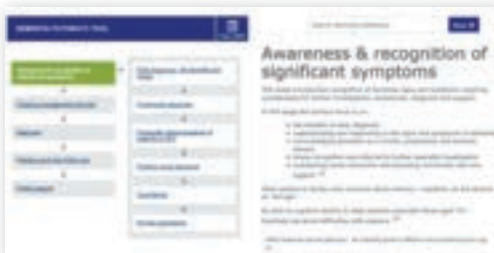
The Dementia Pathways Tool provides a comprehensive yet intuitive web-based repository of dementia-related information, tools, service directories and resources and, unlike many other resources, is publically available. This enables community access to information about dementia that may be of relevance, including family and carer support, financial and legal issues, driving capabilities and powers of attorney.

Expanded adoption of the Dementia Pathways Tool is consistent with the increasing prevalence of the disease. Dementia is one of the leading causes of death in Australia and in recent years has been declared a national health priority.

The collaborative re-development of the Dementia Pathways Tool included the original partner group (the Grampians Region Dementia Advisory group), along with the South Eastern Melbourne Primary Health Network, Dementia Pathway Working Group. Together they guided the development of the latest version of the Tool with content updates progressed in consultation with Associate Professor Mark Yates, from the Cognitive Dementia and Memory Service, Ballarat Health Services and Deakin University.

Dementia Pathways Tool research, led jointly by CeRDI and project partners has confirmed positive feedback from general practitioners (GPs) and practice nurses in the Grampians region. There are plans to extend this research to understand the practitioner adoption outcomes of the Dementia Pathways Tool in south eastern Melbourne.

A central entry point has been established to enable access to Dementia Pathways Tools for the Grampians and the south east Melbourne regions. A short video with Associate Professor Mark Yates has also been developed to introduce Dementia Pathways Tool to GPs and practice nurses.



Project Partners:

- Western Victoria Primary Health Network
- Grampians Medicare Local
- Ballarat Health Services
- Deakin University
- South Eastern Melbourne Primary Health Network

The Dementia Pathways Tool is available at www.dementiaphways.com.au

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HERITAGE AND CULTURE

Historic Urban Landscape Ballarat and Visualising Ballarat

During 2015, CeRDI and the City of Ballarat collaborated on the Historic Urban Landscape (HUL) Ballarat web portal. The portal is one of the strategies developed for Ballarat, as a member of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Historic Urban Landscape Global project, to ensure the city continues to retain its character, landscape and cultural significance as it grows.

With the use of innovative spatial mapping and knowledge management tools, the interactive web portal has been designed to engage the community and enable users to easily access authoritative and credible information. HUL Ballarat is helping to create an awareness of the urban landscape and its cultural significance and will empower community members and local organisations to contribute to Ballarat's future development.

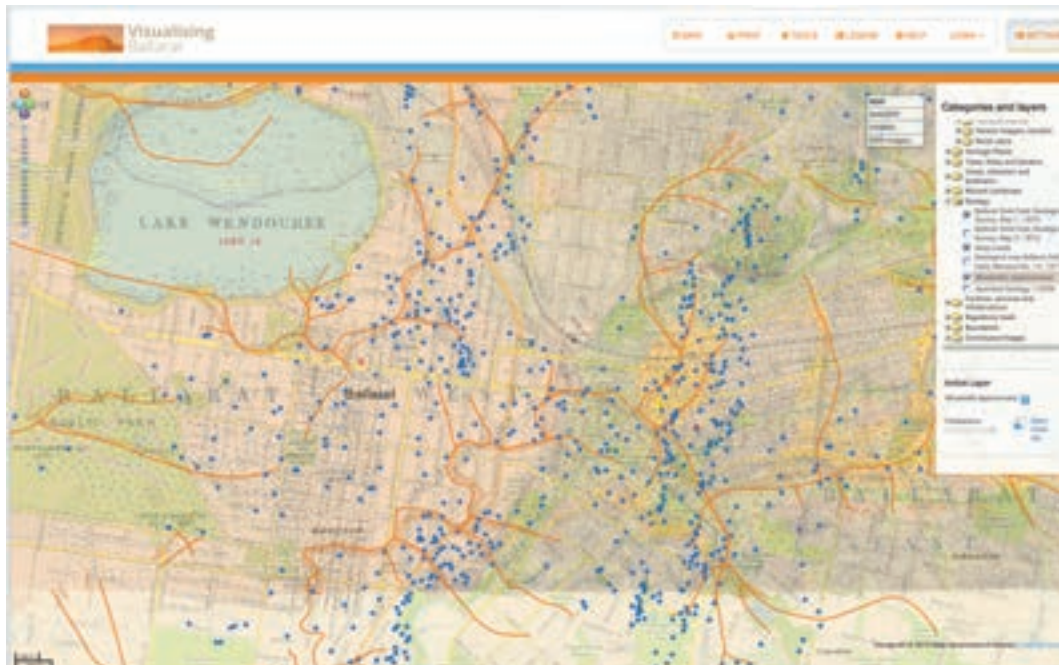
An associated project, Visualising Ballarat, offers state of the art knowledge management and urban planning tools to assist in assessing and monitoring change.

Both HUL Ballarat and Visualising Ballarat have been designed to help stakeholders, community members, practitioners and researchers to come together and identify community values, landscape values and acceptable levels of change.

Initial impact research has been conducted by CeRDI's Dr Angela Murphy and colleagues. This first wave of research sought to capture substantial base-line data to support the assessment of longer-term impacts of HUL Ballarat and Visualising Ballarat. The research, which included input from a diverse range of participants, identified that the portals are beginning to be adopted as a platform for collaboration in the process of urban planning and development.

Overt measures of positive impact were found in increasing levels of usage, assessments of the quality of the portal content and the overall view that HUL Ballarat and Visualising Ballarat have the potential to facilitate community engagement and to build community connection and collaboration. The majority of those involved in the interview component of this research felt that the portals were a means to establish partnerships and alliances throughout the community. Recommendations were provided to support future development of HUL Ballarat and Visualising Ballarat. Research to examine the impacts on practice across and within community, planning, business and research environments will continue in 2016.

In September 2015 HUL Ballarat and Visualising Ballarat received the 2015 Victorian Spatial Excellence Award for People and Community. The projects will now advance as finalist in the Asia Pacific Spatial Excellence Awards, which will be held in conjunction with the Locate16 conference in April 2016.



Victorian Spatial Excellence Award 2015

From left: Ms Kellee Ireland (Executive Director Operations, SIBA), CeRDI's Association Professor Helen Thompson, Councillor Samantha McIntosh and Ms Susan Fayad, both from the City of Ballarat.



Project Partners: City of Ballarat

HUL Ballarat is available at www.hulballarat.org.au

Visualising Ballarat is available at www.visualisingballarat.org.au

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REGIONAL DEVELOPMENT

Western Business Accelerator and Centre of Excellence

The Western Business Accelerator and Centre for Excellence (Western BACE), located at Melton, is an innovative initiative to enhance long term employment and community opportunities for residents living in one of Australia's major growth corridors. Western BACE commenced operation in May 2015.

The City of Melton received \$14.6 million from the Suburban Jobs Program, an initiative of the Commonwealth Government Department of Environment, towards the \$21 million establishment costs for the Western BACE.

The Western BACE is designed to accommodate an innovative, multifunction centre offering a range of business accelerator activities through:

- accelerator office and workspaces to support fledgling businesses;
- business support and development through the Centre for Excellence;
- training and training spaces for tenant businesses, social services, local education providers; and
- construction of an environmentally sustainable building.

The establishment of Western BACE was led by Melton City Council together with Lend Lease, the Growth Areas Authority, Victoria University, Kangan Institute, Burbank Homes and FedUni. The longer-term aim of the initiative is to improve economic, educational and community opportunities for Melton and the west Melbourne growth corridor.

The Western BACE Research Group comprising FedUni, Victoria University and Melton City Council was established in 2013 to undertake research, monitoring and evaluation activities in parallel with the planning, design, construction and operating phases of the Western BACE.

This research offers insights pertaining to business growth, employment and community development. Key findings from the business and wider community will focus on the access and uptake of new technologies, public transport, community and public services, and business engagement. During 2015 the research program included an examination of the role of Western BACE project partners. A case study to gain insights from new tenants at the Western BACE is progressing and will be completed in early 2016.

Longitudinal research in association with the Western BACE has been established through an agreement between CeRDI, FedUni and Melton City Council. An industry-based PhD scholarship for research linked with the Western BACE will commence in mid-2016.



Project Partners:

Melton City Council

Victoria University

Commonwealth Government Department
of Environment

Western BACE

For more information about the Western
BACE see
www.westernbaceresearch.com.au

Key Contact

Alison Ollerenshaw, CeRDI Research Fellow:
a.ollerenshaw@federation.edu.au

Staff Profiles

Research



**Associate Professor
Helen Thompson,
Centre Director**

Doctorate of Business Administration, Bachelor of Commerce (Accounting) with Distinction

Helen has led Centre activities since 2002 and is responsible for the achievement of all CeRDI organisational objectives in respect of research, project management, partner projects, business development and financial management. Under Helen's leadership, CeRDI has become one of the University's most successful research centres, establishing a reputation for excellence at the regional, national and international level. Helen has organisation wide leadership for eResearch. She is engaged in research into the use of ICT and is involved in a range of activities which contribute to the economic and social development of regional and rural Victoria. Helen was appointed as one of 20 National Broadband Champions 2011–13. She is a member of GovHack Ballarat Working Group; Chair of Committee for Ballarat Maximising eHealth Taskforce; Governance Group member for the Federation for Advancement of Victorian eResearch and Committee Member for the Regional Universities Network Regional Futures Conference.



**Associate Professor
Peter Dahlhaus,
Principal Research Fellow**

PhD, Master of Applied Science,
Bachelor of Applied Science

Peter joined CeRDI in 2012 as an experienced researcher and geologist. He has a comprehensive knowledge of the geology, geomorphology and hydrogeology of south west Victoria where he has been influential in applying his scientific knowledge to direct policy on salinity and soil health management as an author of catchment action plans and strategies, and municipal planning overlays. Peter is well known as a science communicator by community groups and as an advisor to various catchment management authorities, water authorities and municipalities in the region. Together with colleagues at CeRDI, Peter's current research focuses on spatial data interoperability and visualisation to ensure that natural resource management data, information and knowledge is globally available to researchers, government agencies, municipalities and the public. Peter is the lead researcher for the Visualising Victoria's Groundwater (VG) project.



Dr Angela Murphy, Senior Research Fellow

PhD, Graduate Diploma Education, Graduate Diploma Criminology, Bachelor of Arts (Social Sciences)

Angela joined CeRDI in late 2014 and has extensive research and engagement experience having previously worked across research centres at FedUni, as a private consultant and within the public health and welfare sector. Angela has managed over 40 research projects and consultancies. Her current focus is on developing evidenced based research to measure eResearch and practice change.



Dr Birgita Hansen, Research Fellow

PhD (Conservation Genetics), Bachelor of Science (Evolutionary Ecology)

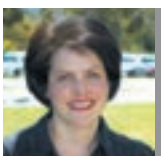
Birgita brings to the CeRDI team extensive experience in ecology and environmental management, contributing to improving the management and dissemination of biodiversity knowledge. Her research to date has focused on understanding the ecological response of birds to modification of their habitat, which has included studies into riparian restoration in agricultural landscapes and waterbird monitoring at local and continental scales.



Dr Margaret Camilleri, Research Fellow

PhD, Master of Social Science (Social Policy), Graduate Diploma Community Development, Bachelor of Arts (Multicultural Studies)

Marg has worked in the community legal sector and the justice system for over 25 years. Much of her work in the criminal justice area has focused on access to justice, particularly for people with disabilities. Marg recently joined CeRDI to lead the Central Highlands Health Justice Partnership for Youth project, which aims to improve legal, health and wellbeing outcomes for disadvantaged young people. The project, funded by the Legal Services Board, includes project partners Ballarat Community Health and Central Highlands Community Legal Centre.



Alison Ollerenshaw, Research Fellow

Master of Applied Science, Graduate Diploma of Applied Science (Professional Psychology), Bachelor of Arts, Diploma Project Management

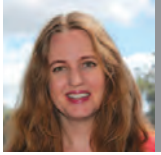
Alison joined CeRDI in 2012 and now provides support across a range of CeRDI projects including the Grampians Natural Disaster Research project, the Dementia Pathways Tool and the Western BACE project. Alison has collaborated on many regional projects that have a health and community development focus.



Robert Milne, Research Associate (Environmental Science)

Bachelor of Applied Science (Environmental Management)

Rob joined CeRDI in 2013. He has specialist skills in geographic information systems and data management and has extensive project management and stakeholder engagement experience gained during his extensive career with FedUni and as partner in the family farming business.



Dr Lisa MacKinney, Research Associate

PhD, Master of Arts (History), Bachelor of Arts (Honours)

Lisa's research ranges in focus from art and culture in medieval Europe to popular music in 1960s USA, in addition to a long history of work on variety of academic projects focussing on Australian local histories, as well as work in academic libraries. Recently, Lisa worked on the Western Australian New Music Archive (WANMA). She joined CeRDI in 2015.



Dr Michelle Graymore, Research Fellow

PhD, Bachelor of Science (Honours) (Environmental Chemistry), Bachelor of Science (Aquatic Science)

Michelle is an environmental sociologist focused on understanding what makes rural and regional communities sustainable, in particular social change processes, social capital and community resilience. Michelle joined CeRDI in 2015 and her current research is focused on the social dimensions of water management, particularly in small towns, methods for understanding community resilience, and the value of local knowledge in decision making.



Jennifer Corbett, Research Officer

Bachelor of Management (Honours) (Marketing)

Jennifer joined CeRDI in 2009. She provides research support across a range of projects including regional ICT studies and projects in the agriculture sector.



Kirsten McKenna, Research Officer

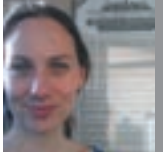
Bachelor of Science (Geology)

Kirsten joined CeRDI in 2013 after working as a hydrogeologist in Melbourne. Kirsten assists with groundwater and soil related projects, including the Visualising Victoria's Groundwater and the Corangamite Soil Health Knowledge Base project.



Meghan Taylor, Research Officer

Meghan commenced at CeRDI in 2011 and provides research support across various projects, including the HUL Ballarat and Visualising Ballarat and Online Farm Trials research. Meghan is currently studying for a Bachelor of Science/Bachelor of Biomedical Science.



Amy Tsilemanis, Research Officer

Masters of Arts

Amy is an artist, producer and researcher working across the arts and heritage fields. She joined the CeRDI team to assist with research and development around the Historic Urban Landscape Ballarat portal, and is passionate about innovative ways of bringing local history to life.

Dr Kelsey McDonald, Project Officer

Graduate Diploma Rural Social Welfare, Bachelor of Arts (Humanities)

Kelsey completed PhD studies in 2015. She joined CeRDI in 2013 on a part-time basis. Kelsey has contributed to the Grampians Natural Disaster Research and the Western BACE project.



Rick Pope, Research Associate

Graduate Diploma in Land Rehabilitation

Rick started working with CeRDI in 2015 and has extensive expertise in Geographic Information Systems and GPS. Rick has a close working relationship with Local Government, the spatial industry as well as Landcare networks in Victoria, Queensland and Western Australia.



Xenon Ellis, Administration Officer, Research Officer

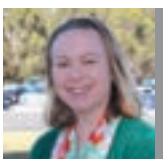
Bachelor of Arts (Media and Communication)

Xenon joined CeRDI in 2014 to work in a support role for the Online Farm Trials research. Growing up in a rural environment, Xenon brings an understanding of agricultural life and a drive to promote sustainable farming practices to the Online Farm Trials research.



Jessica Lockyer, Administration Officer, Research Support

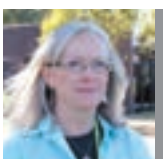
Jessica joined CeRDI in 2014. She provides research support across various projects, including the GRDC Online Final Reports research. Jess is currently studying for a Bachelor of Management.



Dr Judi Walters, Administration Officer, Research Support

PhD (Forest Ecology), Master of Science, Bachelor of Forest Science (Honours), Certificate IV (Professional Writing and Editing)

Judi commenced at CeRDI in 2015 having worked extensively within the field of scientific research, publishing and editing from within a range of organisations and universities spanning fields such as forest ecology, bushfire research and contaminated lands auditing. Judi joined the OFT team and provides support services within CeRDI.



Sue Veitch, Administration Officer, Research Support

Diploma Art and Design

Sue joined CeRDI in mid-2015. Prior to working at FedUni, Sue Worked as a Book Designer for several educational publishers. Sue works on a part time basis undertaking administration duties and research assistance.

Technical



Andrew Macleod, Manager Technical Projects

Honours Applied Science (Information Technology), Bachelor of Computing

Andrew joined CeRDI in 1999. He provides technical leadership for all Centre activities. Andrew has been instrumental in developing the technology innovations, data interoperability and knowledge management approaches demonstrated through CeRDI spatial initiatives.



Paul Feely, Senior Programmer

Bachelor of Computing (Honours)/Bachelor of Commerce

Paul joined CeRDI in 2003. He specialises in PHP and MySQL development and has been the lead programmer on major projects including Sport and Recreation Spatial and Online Farm Trials.



Craig Briody, Web Developer

Bachelor of Computing

Craig joined CeRDI in 2002. Craig specialises in the development and implementation of web-based projects as well as having significant experience in the development and delivery of comprehensive client training programs.



Heath Gillett, Programmer

Bachelor of Computing

Heath joined CeRDI during 2009. He has extensive experience in design, programming, implementation and support of various IT systems. Heath has been a lead developer on key projects including the Barwon South West Knowledge Base and GRDC Online Final Reports project.



Scott Limmer, Systems Analyst Programmer

Bachelor of Information Technology

Scott joined CeRDI in 2008 to provide assistance with expanding programming and web development activities. Since then he has introduced new multimedia and web2 technology skills to the team and has involvement in key projects including Land Your Career, Grain and Graze 3 and Dementia Pathways Tool.



Sudeera Abeywickrema, Web Developer

Bachelor of Information Technology

Sudeera joined CeRDI in 2013. Sudeera contributes to the implementation of a range of web-based applications and systems and the integration of emerging technologies to enhance CeRDI outcomes.



Chris Elliott, Digital Marketing Officer

Bachelor of Business (Marketing) with Distinction

Chris commenced work with CeRDI in 2013. He is an experienced digital marketing professional, graphic designer and business development specialist. Chris delivers workshops and mentoring to support the Central Highlands Digital Enterprise (DigiBiz) project.



Drew Collins, Technical Assistant

After completing work experience with CeRDI in 2011, Drew was later employed on a casual basis to provide technical assistance across a range of projects. Drew is currently studying for a Bachelor of Film and Television.



Jack Spencer, Technical Assistant

Jack joined CeRDI in 2015 and provides technical assistance across a range of projects. He works on a part-time basis in CeRDI while completing a Bachelor of Communication Design at Swinburne University.

Project and Administration



Greg McKenzie, Project Manager

Graduate Diploma of Education, Bachelor of Science, Project Management Professional (PMP®) Certified

Greg joined CeRDI in 2013 to provide leadership and end-to-end management of a number of concurrent projects. He also contributes to business development activities within CeRDI.



Laurel Freeland, Social Ecologist

Master of Education

Laurel Freeland is a skilled facilitator, researcher and community engagement consultant. Laurel has worked at Federation University Australia since 2010 and is working with CeRDI providing her support and expertise on the Climate Ready project.



Kathy Gamble, Administration Support Officer

Graduate Diploma of Education, Diploma of Fine Art

Kathy joined CeRDI in January 2013 after five years with the Federation Business School. Kathy assists the CeRDI team with administrative support across various projects and is the personal assistant to the Centre Director.

Research Associates



Gerrie Carr-MacFie, Project Manager

Bachelor of Arts (Regional Development)

Gerrie is an experienced regional development and community engagement practitioner. She joined CeRDI in 2012 to manage the Central Highlands Digital Enterprise (DigiBiz) project.

Postgraduate Students

Maged Al Mandalawi (PhD P/T)

PhD title: Complex rock slope failures in large scale open cut mine: mechanism and evaluation.

Faculty: Science and Technology

Year commenced: 2012

Supervisors: Dr G. You (PS, FoST), Assoc Prof K. Dowling (AS, FoST), Assoc. Prof. P. Dahlhaus (AS)

This project investigates slope stability at the Handlebar Hill open cut mine, Mt Isa, Queensland. The research investigates the potential failure mechanisms of the mine pit slopes through kinematic and dynamic analyses, using the pit geology, geometry and rock mechanics.

Mahinda Jayasooriya (PhD P/T)

PhD title: Improving the accuracy of groundwater infiltration estimates in sewer networks.

Faculty: Science and Technology

Year commenced: 2012

Supervisors: Assoc. Prof. P. Dahlhaus (PS), Prof P. Gell (AS), Dr A. Barton (CS, GWM Water)

Groundwater infiltration into sewerage systems is an on-going challenge experienced by water utility managers throughout the world. This research aims to provide more accurate estimations of groundwater infiltration in terms of volume and flow rate to assist decision-making in regard to sewer rehabilitation and the effective management of sewer networks. The project focuses on Ballarat's sewer system as a case study.

Adam Marshall (Masters P/T)

PhD title: Precipitation and evaporative aspects of the terrestrial water balance in Central Victoria and their relationship to large-scale climate drivers during the growing season.

Faculty: Science and Technology

Year commenced: 2012

Supervisors: Prof P. Gell (PS), Assoc. Prof. P. Dahlhaus (AS)

This Masters by Research examines trends and large-scale climate forcing of precipitation and pan evaporation at selected sites in central Victoria, for the period 1972–2013, with particular emphasis on the growing season (March to November). Climate changes in the terrestrial water balance are critical to long-term variability in effective precipitation for agriculture in the region.

Nathan Robinson (PhD)

PhD title: Assessing productive soil-landscapes in Victoria, Australia using digital soil mapping.

Industry partner: Department of Economic Development, Jobs, Transport and Resource

Faculty: Science and Technology

Year commenced: 2012

Supervisors: Assoc. Prof. P. Dahlhaus (PS), R. MacEwan (CS), Dr P. Vamplew (AS)

Spatial soil information is used by society to support questions on agriculture and the environment at global to local scales. This research investigates the spatial soil information needs of biophysical modellers and the stochastic and epistemic uncertainties in the data to understand the limitations of harmonising legacy data in spatial inference models. The findings of the research are implemented in creating digital soil mapping data sets for western Victoria that are more reliable, easy to use and understood by a growing community of users.

Himalaya Singh (PhD)

PhD title: Geographic and epidemiological analysis of sports and recreational injuries of Victoria, Australia.

University partner: Australian Centre for Research into Injury in Sport and its Prevention (ACRISP)

Faculty: Health

Year Commenced: 2013

Supervisors: Prof Caroline Finch (ACRISP); Assoc. Prof. Helen Thompson (CeRDI); Dr Lauren Fortington (ACRISP); Assoc Prof Rochelle Eime (Faculty of Health FedUni and ISEAL Victoria University)

Sports and leisure injuries have been recognised as a public health issue in Australia with an estimated economic cost of \$1.8 billion per annum. This figure is increasing significantly every year. Possible explanations for this could be insufficient information about vulnerable communities or incomplete understanding of sports injury aetiology. In particular, a spatial epidemiological approach is used to identify target communities for injury prevention programs, and to better understand injury aetiology. There are very few studies that have used spatial epidemiological approaches to understand sports injuries. This research intends to apply a spatial approach to sports injury data, which will offer significant benefits for injury surveillance, allocation of resources and development of effective injury prevention programs.

Publications

Journal Publications and Book Chapters

Al Mandalawi M., You G., Dowling K. & **Dahlhaus** P. (in press). Kinematic assessment of slopes at Handlebar Hill open cut mine, Mt Isa, Queensland, Australia. *International Journal of GEOMATE* 10(1), 1575–1583.

Al Mandalawi M., You G., **Dahlhaus** P.G., Dowling K. & Sabry M. (2015). Slope stability and rockfall hazard analysis in open pit zinc mine. *International Journal of GEOMATE* 8(1), 1143–1150.

Clemens R.S., Rogers D., **Hansen** B.D., Gosbell K., Minton C., Straw P., Bamford M., Woehler E.J., Milton D., Weston M., Venables W., Weller D., Hassell C., Rutherford W., Onton K., Herrod A., Studds C.E., Choi C.-Y., Dhanjal-Adams K., Skilleter G., Fuller R.A. (in press). Continental-scale decreases in shorebird populations in Australia. *Emu Austral Ornithology*, 116(2) 119–135.

Currell M.J., **Dahlhaus** P.G. & li H. (2015). Stable isotopes as indicators of water and salinity sources in a southeast Australian coastal wetland: identifying relict marine water, and implications for future change. *Hydrogeology Journal* 23(2), 235–248. doi: 10.1007/s10040-014-1199-9

Currell M.J., Gleeson T. & **Dahlhaus** P.G. (in press). A new assessment framework for transience in hydrogeological systems. *Groundwater* 54(1), 4–14.

Dahlhaus P., **Murphy** A., **MacLeod** A., **Thompson** H., **McKenna** K. & **Ollerenshaw** A. (in press). Making the invisible visible: the impact of federating groundwater data in Victoria, Australia. *Journal of Hydroinformatics* 18(2), 238–255.

Eime, R.M., Harvey J.T., Charity, M. J., Casey, M. M., Westerbeek, H. & Payne, W. R. (in press). Age profiles of sport participants. *BMC Sports Science, Medicine and Rehabilitation*, 8(6).

Grace M., Malone J. & **Murphy** A. (in press). WAND: An activity program for women in a rooming house. *Affilia*, 31(1), 84-97.

Hale R., Reich, P., Johnson, M., **Hansen** B., Lake P.S., Thomson J.R. & Mac Nally R. (2015). Bird responses to riparian management of degraded lowland streams in southeastern Australia. *Restoration Ecology* 23(2), 104–112. doi:10.1111/rec.12158

Hansen B.D., Menkhorst P., Loyn R.H. & Moloney P. (2015). Long-term declines in multiple waterbird species in a tidal embayment, south-east Australia. *Austral Ecology* 40(5), 515–527. doi:10.1111/aec.12219

Hansen B.D., Reich P., Lake P.S. & Cavagnaro T. (2015). Challenges in applying scientific evidence to width recommendations for riparian management in agricultural Australia. *Ecological Management & Restoration* 16(1), 50–57. doi:10.1111/emr.12149.

Ollerenshaw A. (2015). Online pathways for dementia care. *Australian Family Physician* 44(7), 510–513.

Rasiah V., Florentine S. & **Dahlhaus** P.G. (2015). Environmental benefits inferred from impact of reforestation of deforested creek bank on soil conditioning: a case study in Victoria, Australia. *Agroforestry Systems* 89(2), 345–355. doi: 10.1007/s10457-014-9771-9

Singh H., Fortington L., **Eime** R., **Thompson** H. & Finch C.F. (2015) Spatial epidemiology: a new approach for understanding and preventing sport injuries. *Australasian Epidemiologist* 22(1), 32–34.

Szabo, J.K., Choi, C.-Y., Clemens R.S., **Hansen**, B. (in press). Conservation without borders – solutions to declines of migratory shorebird in the East Asian-Australasian Flyway. *Emu Austral Ornithology*, 116(2) 215–221.

Conference Papers, Presentations and Abstracts and Keynote Presentations

Dahlhaus P.G., **Murphy** A., **MacLeod** A., **Thompson** H. & **McKenna** K. (2015). Changing practices: the impact of making groundwater data visible through an interoperative web portal in Victoria, Australia. AQUA2015, 42nd IAH Congress, September 13–18, 2015, Rome, Italy.

Jayasooriya M., Barton A., **Dahlhaus** P. & **Gell** P. (2015). An assessment of the monitoring methods for inflow and infiltration in sewer networks. 36th Hydrology and Water Resources Symposium, 7–10 December, 2015, Hobart.

Simons B., Nation E. & **Dahlhaus** P. (2015). Improving access to groundwater data using GroundWaterML2. 36th Hydrology and Water Resources Symposium, 7–10 December, 2015, Hobart.

Major Reports

Dahlhaus P.G. (2015). Corangamite soil health research project: literature review and gap analysis. Research report for the Corangamite Catchment Management Authority. Centre for eResearch and Digital Innovation, Federation University Australia (Ballarat). 57p.

Dahlhaus P.G. & **Thompson** H. (2015). Cotton Research and Development Corporation - eResearch Knowledge Base: Online data and tools to enhance Australian cotton research. Discussion Paper. Centre for eResearch and Digital Innovation. Federation University Australia. 15p.

Dahlhaus P.G. & **Thompson** H. (2015). Water for Australian Agriculture: Short Concept Proposal: Visualising Australia's Groundwater. Prepared for Minderoo Group, Dalkeith, Western Australia. Centre for eResearch and Digital Innovation. Federation University Australia. 14p.

Elliott C. & Freeland, L. (2015). Climate Ready Community Focus Groups: Overview of Outcomes. Centre for eResearch and Digital Innovation. Federation University Australia. 20p.

Murphy A., **Dahlhaus** P., **MacLeod** A., **Thompson** H., **McKenna** K., **Ollerenshaw** A., **Corbett** J. & **McDonald** K. (2015). Visualising Victoria's Groundwater: researching and analysing Impact. Phase 1, first wave research report prepared for the Collaborative Internet Innovation Fund.

Murphy A., **Dahlhaus** P., **MacLeod** A., **Thompson** H., **McKenna** K., **Tsilemanis** A., **Ollerenshaw** A. & **Corbett** J. (2015). Historic Urban Landscape (HUL) and Visualising Ballarat – eResearch (First Wave) extended timeframe research study. Report prepared for City of Ballarat and UNESCO.

Ollerenshaw A., **Murphy** A., **McDonald** K. & **Thompson** H. (2015). Western BACE Partnership Research Report 2015. Centre for eResearch and Digital Innovation. Federation University Australia. 57p.

Ollerenshaw A., **Thompson** H., & **McDonald** K. (2015). Western BACE Community Survey: Research Report 2015. Centre for eResearch and Digital Innovation. Federation University Australia. 34p.

Ollerenshaw A., **Thompson** H., & **McDonald** K. (2015). Western BACE Research, Monitoring and Evaluation: Business Innovation Survey Report 2015. Centre for eResearch and Digital Innovation. Federation University Australia. 23p.

Trewarn A., **Graymore** M., Reeves J. (2015). Environmental Scan and Literature Review for Gippsland Lakes Feasibility Study. Report to East Gippsland Catchment Management Authority. School of Applied and Biomedical Sciences and Centre for eResearch and Digital Information, Federation University Australia.



Associate Professor Helen Thompson during her visit to Vietnam.

Regional Universities Network – Vietnam Collaboration

CeRDI's Helen Thompson Participant in Delegation to Vietnam Exploring Precision

Agriculture: During November 2015, CeRDI Director Associate Professor Helen Thompson joined a Regional Universities Network (RUN) delegation that visited Vietnam to establish collaborations through joint research interests in agriculture.

The program included site visits, seminars and workshops across multiple locations in Vietnam. Delegates met counterparts from universities and government with the aims of the delegation including:

- research collaboration for regional development (Vietnam-Australia);
- establishing networks between key stakeholders across universities, institutions, departments and rural communities;
- developing joint projects to enable staff and student exchanges with the aim of establishing multi-disciplinary research projects; and
- identifying learning and teaching opportunities between institutions in Australia and Vietnam.



2015 Vic Health Awards finalist. From left: CeRDI's Associate Professor Helen Thompson and Mr Paul Feely, Dr Jack Harvey and Associate Professor Rochelle Eime (both from FedUni and Victoria University) and Professor Warren Payne (Victoria University).

Awards

2015 Victorian Spatial Excellence Awards; Environment and Sustainability: Corangamite Soil Health Knowledge Base.

2015 Victorian Spatial Excellence Award; People and Community: Historic Urban Landscape (HUL) Ballarat and Visualising Ballarat.

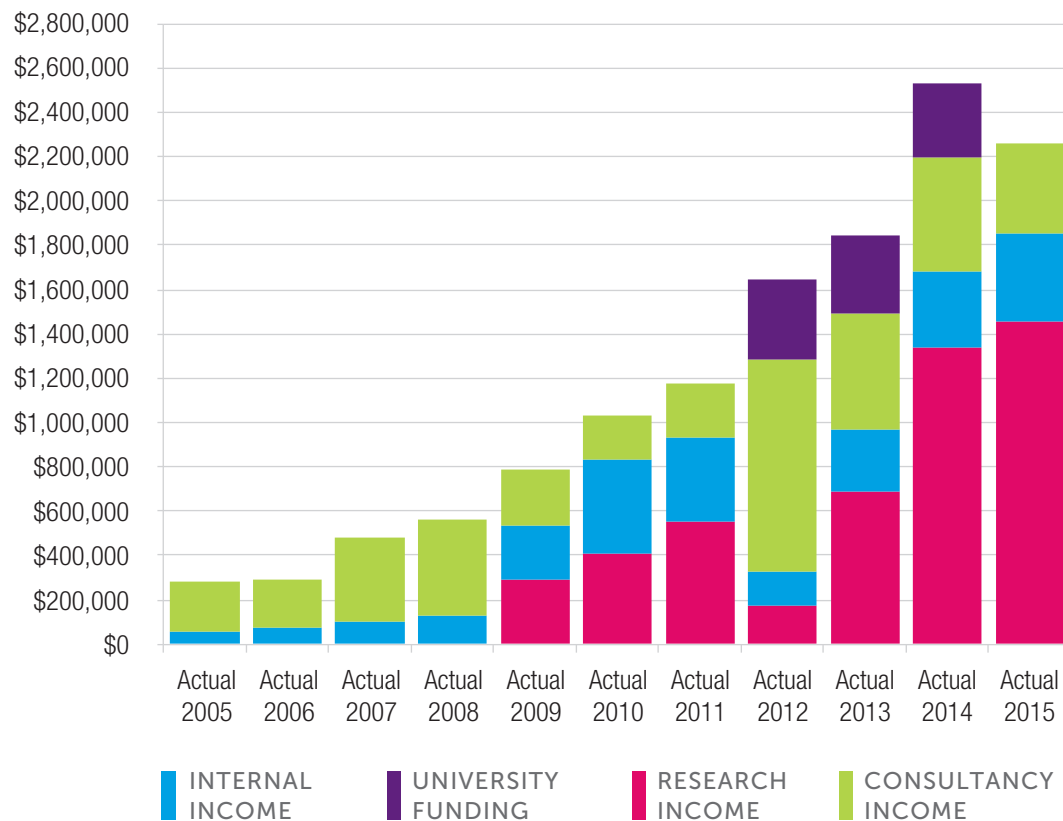
2015 Victorian International Education Awards: Finalist in the Industry Partnership category.

2015 VicHealth Awards: Sport and Recreation Spatial: Finalist in the Research into Action category.

Research Income

The following chart illustrates CeRDI's income from 2005 to 2015.

The key performance measure of research income continues to grow year on year¹. Research income in 2015 was \$1.45M, an increase of 9% from 2014.



¹ Research income in 2012 was substantially higher than shown in the chart. The research income shown in 2012 was due to the method of income classification which was operating in Research Services during that period.

The change in the University Funding component of income for 2015 shown above reflects the University's organisational change for the Corporate Web Team, which in 2015 was only under CeRDI administration for the first quarter.

Research Partnerships and Collaborations

CeRDI research partners in 2015 included the following organisations:

Ararat Rural City Council	Country Fire Authority
Australian Football League Victoria	Cricket Victoria
Australian National Data Service	CSIRO
Australian National University (Integrated Catchment Assessment and Management Centre)	Dairy Industry Victoria
Australian Sports Commission	Dairy Innovation Australia Limited
Australian Tourism Accreditation Program Ltd	Deakin University
Ballarat Community Health	Department of Broadband Communications and the Digital Economy
Ballarat Health Services	Department of Health (Grampians)
Ballarat ICT Limited	Department of Justice
Barrington Strategic	Emergency Management Victoria
Barwon South West Regional Strategic Fire Management Planning Committee	Federation of Community Legal Centres
Basketball Victoria	Fitzroy Legal Service
Bayside City Council	Foundation for Rural and Regional Renewal
Bendigo TAFE	Geological Survey of Victoria
Birchip Cropping Group	Glenelg Shire Council
Bowls Victoria	Golden Plains Shire Council
Bureau of Meteorology	Goulburn Murray Water
Cancer Australia	Grains Research and Development Corporation
Central Highlands Community Legal Centre	Grampians Integrated Cancer Services
Central Queensland University	Grampians Medicare Local
City of Ballarat	Gunaikurnai Land and Waters Aboriginal Corporation
Colac Otway Shire Council	Gunaikurnai Traditional Owner Land Management Board
Commonwealth Government Department of Communications	Helen McPherson Smith Trust
Commonwealth Government Department of Environment	Hepburn Shire Council
Community Legal Centres NSW	Hockey Victoria
Cooperative Research Centre for Spatial Information	Horsham Rural City Council
Corangamite Catchment Management Authority	Hume Riverina Community Legal Service
Corangamite Catchment Management Authority Land Health Program Steering Committee	Institute of Sport, Exercise and Active Living
Corangamite Shire Council	International Plant Nutrition Institute
	Interpath Pty Ltd
	Kingston City Council
	continued over page...

Kondinin Group	Southern Grampians Shire Council
Lateral Plains	Southern Rural Water
Legal Services Commission of South Australia	South West Institute of TAFE
Leo Cussen Institute	Sunraysia Institute of TAFE
Liebe Group	Surf Coast & Inland Plains Network
Livestock Saleyards Association of Victoria	TAFE Directors Australia
McCallum Disability Services	Tennis Victoria
Melton City Council	Thiess Services Pty Ltd
Mitchell Institute for Health and Education Policy	The University of Melbourne
Mornington Peninsula Shire Council	Timber Training Creswick
Moynes Shire Council	Tourism Council of Western Australia
MTA Optima	UNESCO
National Association of Community Legal Centres	University of New England
Natural Resources Canada	University of Southern Queensland
Netball Victoria	University of the Sunshine Coast
Nicon Rural Services	VicHealth
Northern Growers Alliance	Victoria Law Foundation
Northern Grampians Shire	Victorian Legal Assistance Forum
NSW Law and Justice Foundation	Victorian Legal Services Board
Open Geospatial Consortium	Victoria University Institute of Sport Exercise and Active Living
Parks Victoria	Victoria University Victoria Institute of Strategic Economic Studies
Peak Fitness	Victorian Adaptation and Sustainability Partnerships
Pyrenees Hay Processors Co-operative	Victorian Country Fire Authority
Pyrenees Shire Council	Victorian Department of Environment, Land, Water and Planning
Queensland University of Technology	Victorian Department of State Development, Business and Innovation
Regional Development Australia (Barwon South West)	Victorian Farmers Federation
Regional Development Australia (Grampians)	VicRoads
Regional Universities Network	VicSport
Rotary District 9780 Conference Committee	Warrnambool City Council
RWD Financial Services	West Wimmera Shire Council
Senserva	Wimmera Development Association
South Eastern Melbourne Medicare Local	Woody Yaloak Landcare Group
Southern Farming Systems	World Heritage Institute of Training and Research for Asia and the Pacific Region



Contact CeRDI

For further details about CeRDI's diverse portfolio of research please visit our websites: www.cerdi.edu.au and <http://spatial.federation.edu.au>

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Centre for eResearch and
Digital Innovation (CeRDI)

