

Digital *Rural Futures*

Regional Futures • Agricultural Futures • Digital Futures

Conference

25-27 June 2014

University of Southern Queensland

Toowoomba, QLD, Australia



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Network

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Regional Futures, Agricultural Futures, Digital Futures

Digital *Rural Futures*

Regional Futures • Agricultural Futures • Digital Futures

Conference Proceedings

University of Southern Queensland

Toowoomba, QLD, Australia

25 – 27 June, 2014

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Foreword

Welcome to the University of Southern Queensland (USQ) in Toowoomba, Queensland, for the second annual Digital Rural Futures Conference, an initiative of the Regional Universities Network (RUN). This conference aims to build upon the success of the inaugural Digital Rural Futures Conference held in June 2013 at the University of New England in Armidale, New South Wales.

This year the conference invites delegates and presenters to reflect upon the themes of Regional Futures, Agricultural Futures, and Digital Futures. The 2014 conference recognises the power of digital technology to act as an enabler to transform the lives of people in regional Australia, linking these dynamic themes. It aims to provide delegates with opportunities to build networks and partnerships locally, nationally and internationally, and raise awareness of challenges and opportunities across the themes of Regional Futures, Agricultural Futures and Digital Futures.

By providing an interface between the researcher and the primary producer, communities, government agencies, industry and other potential partners, the conference provides a platform to discuss and debate the regional agenda amongst a range of diverse stakeholders.

We are proud to host a number of high calibre national and international keynote and invited speakers, who join us to share their knowledge and expertise in their individual fields.

In addition, we have received a high number of presentation abstracts and with strong conference registrations we hope that the conference is informative, generates rich discussion and is an enjoyable experience for all those who attend.

The Conference Proceedings provide important conference information for delegates including abstracts of all presentations and posters.

We would like to take this opportunity to thank you for attending the 2014 Digital Rural Futures Conference and we look forward to continuing to raise the awareness of the opportunities and challenges affecting rural and regional Australia.

Professor Mike Keppell and Associate Professor Shirley Reushle, Conference Co-Convenors.

Acknowledgements

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Special Thanks

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Dr John Bennett, National Centre for Engineering in Agriculture, University of Southern Queensland

Tours:

Mt Kent Observatory Tour

Associate Professor Brad Carter and Dr Rhodes Hart, University of Southern Queensland

Smart Farms Tour

Mr Steven Rees, Senior Research Engineer, National Research Engineer at the National Centre for Engineering in Agriculture, University of Southern Queensland

Brisbane West Wellcamp Airport Tour

Mr Phil Gregory and Mr John Wagner, Wagner Global Services

**Information provided in the conference proceedings is based on presenter registration details and the conference program at the time of publication.*

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Regional Futures, Agricultural Futures, Digital Futures

Program Overview

Wednesday 25th June

8:00 am - 10:00 am	Conference Registration
10:00 am – 10:30 am	Welcome and Official Opening
10:30 am – 11:30 am	Keynote: Neil and Mark Gardyne
11:30 am – 12:00 pm	Parallel Sessions
12:00 pm – 12:45 pm	Lunch and Poster Session
12:45 pm – 1:45 pm	Keynote: Dr Wendy Craik AM
1:45 pm – 2:00/2:15 pm	Parallel Sessions
2:00 pm – 2:15 pm	Parallel Sessions
2:15 pm – 2:30/2:45 pm	Parallel and Panel Sessions
2:30 pm – 2:45 pm	Parallel Session
2:45 pm – 3:00 pm	Afternoon Tea
3:00 pm – 3:45 pm	Invited Speaker: Janelle Reimann
3:45 pm – 4:00 pm	Grains R&D Corporation Presentation
4:00 pm – 4:30 pm	Parallel Sessions
4:30 pm – 5:00 pm	Parallel Sessions
5:00 pm	Close for Day 1
6:15 pm for 6:30 pm start	Conference Dinner (Empire Theatre)

Thursday 26th June

8:00 am – 8:50 am	Conference Registration
8:50 am – 9:00 am	Day 2 Welcome and Housekeeping
9:00 am – 10:00 am	Keynote: Professor John Traxler
10:00 am – 10:30 am	Morning Tea

10:30 am – 11:15 am	Invited Speaker: Professor Snow Barlow
11:15 am – 11:30 am	Parallel Sessions
11:30 am – 11:45 pm	Parallel Sessions
11:45 pm – 12:00 pm	Parallel Sessions
12:00 pm – 12:15 pm	Parallel Sessions
12:15 pm – 1:00 pm	Invited Speaker: Dr Alison McCarthy
1:00 pm – 1:30 pm	Lunch and Poster Session
1:30 pm – 2:00 pm	Parallel Sessions
2:00 pm – 2:30 pm	Parallel Sessions
2:30 pm – 3:00 pm	Parallel Sessions
3:00 pm – 3:15 pm	Afternoon Tea
3:15 pm – 4:15 pm	DVC/PVC (Research) RUN Panel Session
4:15 pm – 4:45 pm	Theme Leaders Session
4:45 pm – 5:00 pm	Awards Presentations
5:00 pm – 5:30 pm	Closing Addresses
5:30 pm	Official Close of Conference
6:30 pm	Pub Networking Evening (Cube Hotel)

Friday 27th June

8:00 am – 8:30 am	Tour Registration (Allison Dickson)
8:30 am – 8:45 am	Make your way to the entrance of the Japanese Garden
8:45 am	Tour buses depart from in front of the Japanese Garden
8:45 am – 12:00 pm	Tours (Morning Tea)
12:00 pm	“Takeaway” Lunch available from Allison Dickson Lecture Theatre Foyer

Conference Information

Venue Information

Venue: University of Southern Queensland, West Street, Toowoomba, Queensland

Conference Rooms: RUN Room (H102), Toowoomba Regional Council Room (R113), NCEA Room (L206), DAFF Q Room (L209), DSITIA Room (C204), ADFI Room (S108).

Maps: See page 115 for a venue map and page 114 for parking information.

For more information on the Toowoomba Campus:

<http://www.usq.edu.au/digital-rural-futures/location>

USQ Campus Security: 4631 2871

Taxi contact number (Toowoomba): 133 222

Conference Registration Desk

Hours: 8am – 12pm, Wednesday 25th and Thursday 26th of June.

Located in the Allison Dickson Lecture Theatre Foyer (H102)

Internet Access

Wi-Fi will be available during the conference. Connection details (username and password) will be provided on registration.

Contact the Conference Registration Desk with any queries.

Printing

Minimal printing is possible. Contact the Conference Registration Desk if required.

Recharge stations

Recharge stations are located on-campus in the following areas:

- Refectory Dining Room, R Block.
- Hub (near Bounce Coffee Shop), R Block.

ICT Services

Please contact the Conference Registration Desk with any queries. However, basic technical assistance is available from the ICT Desk located in R Block, Student Computer Area (near Bounce Coffee Shop). The desk is normally staffed 9am – 3pm, Monday to Friday.

PCs are available for use in R Block, Student Computer Area. You will need the Wi-Fi username and password to gain access.

Name badges

We ask you to please wear your name badges throughout the conference as it helps promote networking and identifies you as belonging to the DRFC group. You may be asked to present your name badge at meal times.

Poster Presentations

Posters will be displayed in the Allison Dickson Lecture Theatre Foyer throughout the conference. Poster authors will normally be stationed with their posters during lunch times. All delegates are encouraged to vote for their favourite poster with the winning poster to be announced at the conclusion of the conference. Delegates can place their vote by completing the voting slip found in the delegate bag and placing it in the voting box located at the Conference Registration Desk.

Conference Dinner

Date: Wednesday 25th June

Time: 6:15pm for a 6:30pm start

Venue: Empire Theatre, 56 Neil Street, Toowoomba

<http://www.empiretheatre.com.au/>

Conference Dinner Parking: Parking, including wheelchair accessible parking, is available in a choice of two car parks to the right when driving north along Neil Street (Neil Street is a one way street). Parking is free after 5:00pm Monday to Friday.

Parking is also available at the Neil St Bus Interchange.

Pub Networking

Date: Thursday 26th June

Time: 6:30pm start

Venue: The Cube Hotel, Corner of Margaret and Neil Streets, Toowoomba
<http://www.cubehotel.com.au/>

Vouchers: A Pub Networking Voucher will be handed out to those attending. The voucher identifies you as a DRFC delegate and entitles you to a one off discount of \$20 on food and drink at The Cube Hotel. Delegates will have to pay any difference if the purchase is above \$20.

Please note: vouchers are for single use only, not redeemable for cash, and only valid on the 26th of June 2014.

Conference Evaluation

We hope that you have an enjoyable and productive conference experience. To enhance the conference experience please complete the DRFC Feedback Survey in your delegate bag and hand it in at the Conference Registration Desk.

Campus Information

Coffee and eateries on-campus

Three food outlets are available on campus:

- Bounce Coffee Shop (R Block) – Muffins, pies, sandwiches, wraps, etc.
- The Refectory (R Block) – Hot and cold food, restaurant and bar. Daily specials are very reasonably priced.
- Subway (C Block) – Across the main quad, opposite R Block.

Bookshop

The Bookshop is located in R Block, adjacent to the Student Computer Area.

ATMs and Banking services

Two ATMs are available on-campus:

- Commonwealth Bank ATM, R Block, near Bounce Coffee Shop.
- Bankmecu ATM, C Block, across the main quad, opposite R Block.

Heritage Bank office, C Block, across the main quad.

Post Office

There is a Post Office located on campus, on the ground floor, G Block, off the main quad area.

Japanese Garden

Ju Raku En ... roughly translated means to enjoy peace and longevity in a public place.

Take the time to stroll through one of the most peaceful and beautiful parks in Toowoomba. The Japanese Garden is located on the northern side of the campus, on a three-hectare site. The entrance to the Garden is north of the Refectory (R Block) through an orange entrance gate in Parking 4; refer to the campus map.

Keynote and Invited Speaker Biographies

Agricultural Futures

Keynote Presenters

Mr Neil Gardyne and Master Mark Gardyne



Neil and his wife Philippa operate two Sheep/Beef and cropping farms in South Island, New Zealand, with about 10,000 Stock units. They have been farming for 14 years.

Neil won the Australasian Rabobank Executive Development Programme in 2010 and was a finalist in the Lincoln South Island Farmer of the Year. Their farming business is in the top 2% for their class of farming. Neil has also started a business recycling coal ash as a fertiliser.

Neil is passionate about innovation and integrating new ideas into the business driving their bottom line.

Neil believes that UAV technology will be a game changer in agriculture and their hexacopter drone is adding value to their business.

Mark Gardyne (13) is the drone pilot and is developing the technology for his parents' farm. He attends Gore High School and has represented his province in rugby, athletics and mathematics.





Regional Futures

Keynote Presenter

Dr Wendy Craik AM

Dr Craik is a Commissioner with the Productivity Commission and has considerable expertise in natural resource management, environmental issues and public policy more generally.

She has held many senior positions including Chief Executive for the Murray-Darling Basin Commission (MDBC), President of the National Competition Council (NCC), Chair of the Australian Fisheries Management Authority (AFMA), Executive Director of National Farmers Federation (NFF) and Executive Officer of the Great Barrier Reef Marine Park Authority (GBRMPA). She has been Director of a number of boards and is currently a Board member of Dairy Australia, Chair of the Australian Rural Leadership Foundation, Deputy Chancellor at the University of South Australia and Chair of the NSW Marine Estate Management Authority.

Wendy was awarded the Member of the Order of Australia in 2007 for service to the natural resource sector of the economy, particularly in the areas of fisheries, marine ecology and management of water reform, and for contributions to policies affecting rural and regional Australia.



Digital Futures

Invited Speaker

Janelle Reimann

Janelle Reimann is the principal of Willunga High School in South Australia and has been an educator for 36 years. She has been a teacher, counsellor, state-wide consultant in IT and equity, leader and Principal for over 25 years. She is currently involved in two National programs: the first is a virtual classroom about Astrophysics and Nanotechnology in a shared environment with other students across Australia. The second is a “Mars Lab” where students manipulate the Mars Rover learning about Space Exploration and Astrophysics, chemistry and biology, through hands on experience.

In 2013 Janelle was a Keynote speaker at Edutech 2013 Brisbane, Keynote speaker at Connected Australia conference Sydney and a speaker at the Australian Council of Educational Leaders Canberra.



Digital Futures

Keynote Presenter

Professor John Traxler

John Traxler is Professor of Mobile Learning, the world's first and a full UK professor since September 2009, and Director of the Learning Lab at the University of Wolverhampton.

He is a Founding Director and current Vice-President of the International Association for Mobile Learning, Executive Committee Member of the USAID mEducation Alliance, Associate Editor of the International Journal of Mobile and Blended Learning and of Interactive Learning Environments.

Professor Traxler is on the Research Board of the Association of Learning Technology and on the Editorial Board of Research in Learning Technology and IT in International Development.



Regional Futures

Invited Speaker

Professor Snow Barlow

Professor Snow Barlow, of the Melbourne School of Land and Environment, is an agricultural scientist with considerable experience in science and research policy. Currently he chairs the Victorian Endowment for Science, Knowledge and Innovation, the Expert Advisory Panel of the Department of Agriculture, Carbon Farming Futures RDE program and is a board member of the Australian Rural Leadership Foundation.

He is a Fellow of Australian Academy of Technological Sciences and Engineering, and the Australian Institute of Agricultural Science. In 2009 he was awarded the 'Australian Medal of Agricultural Science'.

Snow has held many senior positions relating to regional Australia including President of Science and Technology Australia; Chair of the Academic Board and Dean of the Faculty of Agriculture and Horticulture, University of Western Sydney; Head of the School of Agriculture and Food Systems, University of Melbourne; Chief Scientist and Director of Agriculture, Forestry and Quarantine Sciences, Bureau of Resource Sciences; and a board member of the Rural Industries Research and Development Corporation and Land and Water Australia.

Together with his partner Winsome McCaughey, Snow operates a vineyard in the Strathbogie Ranges in North Eastern Victoria and markets premium wine under the Baddaginnie Run label.



Agricultural Futures

Invited Speaker

Dr Alison McCarthy

Dr Alison McCarthy is an irrigation and mechatronic research engineer within the National Centre for Engineering in Agriculture (NCEA) at the University of Southern Queensland. She has been involved with research projects in the cotton industry for seven years funded by the Cotton Research and Development Corporation.

Her research has led to the development of real-time adaptive irrigation control and plant-based sensing systems. In field trials the systems have been demonstrated to improve the irrigation and productivity of field crops under pressurised and surface irrigation systems. Her current projects also involve the development of remote crop monitoring systems in grains variety trials.

Oral Presentation Abstracts

(Abstracts listed according to conference program – subject to change)

Wednesday 25th June

10:30am – 11:30am

Keynote Presentation: Agricultural Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

AGRIDRONE ‘Geospatial innovation’ the next exciting launch

Mr Neil Gardyne and Master Mark Gardyne

Our Drone journey started two years ago when we collected real time data without having to physically go to the particular enterprise with a quad bike or vehicle. This reduced our dead running time by 40% and reduced our risk of injury, which allowed us to strategically plan our business based on real time data.

We have subsequently purchased our second Drone and have developed ‘missions’ that can be autonomously flown to look for cast sheep and monitoring water troughs. We believe there are hundreds of applications for drone technology on a farm. We are the Beef and Lamb Demonstration Farm for Drones that has provided exposure to NZ agriculture.

In addition, drones are capturing the interest of young people, which will enhance agricultural resilience and sustainability of farming into the next generation.

11:30am – 12:00pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

The Brisbane West Wellcamp Airport: A regional game changer

Mr John Wagner (Wagner Global Services)

Brisbane West Wellcamp Airport is currently under construction and will be operational by the end of 2014. Hailed as a game changer for the Toowoomba region, this jet-capable public airport will be available for regular passenger services, charter flights, fly-in-fly-out services and airfreight. The airport is designed to cater for large jets up to 747 size, allowing for even the largest of airfreight direct into the region.

Toowoomba is the second largest agricultural region in Australia behind Moree Plains in New South Wales with the Western Downs area also ranked in the top 10 for agricultural output. The airport will provide direct agricultural export opportunities for numerous markets including fresh fruit & vegetables, chilled beef, flowers and live equine movement to potential destinations such as New Zealand and parts of Asia.

11:30am – 12:00pm

Parallel Session: Regional Futures

Venue: Toowoomba Regional Council Room, R113

Innovative mental health solutions for regional well-being and resilience

Dr Sonja March (University of Southern Queensland), Dr Michael Ireland (University of Southern Queensland), Dr Charlotte Brownlow (University of Southern Queensland), Dr Hong Eng Goh (University of Southern Queensland), Dr Amy Antonio (University of Southern Queensland), Professor Gerry Tehan (University of Southern Queensland), Professor Mike Keppell (University of Southern Queensland)

As the second largest and most decentralised state in mainland Australia, Queensland possesses population and geographical characteristics that produce unique challenges to the health and resilience of communities outside of its metropolitan centres. Research gaps are apparent in the absence of a comprehensive examination of the unique needs of various regional communities and of health professionals servicing these communities. Significant opportunity exists to integrate digital, innovative and flexible solutions into the provision of health and mental health care services to regional areas, yet little systematic evaluation or attempts at resource dissemination exist. This presentation introduces a newly formed team of researchers from clinical health and mental health backgrounds, as well as experts in digital technologies and online learning systems. It will describe a program of research that represents a consolidation of expertise, collaborations and projects that is uniquely placed to shed light on the health and wellbeing issues of regional communities in Southern Queensland and make meaningful inroads towards amending these. Specifically, it will provide an overview of our program of research that aims to identify unique, local health and mental health needs, as well as building upon these findings to develop and disseminate multi-level assessments, interventions and resources targeting various health and mental health problems at the individual, family and community level. The current program has the potential to bridge significant gaps in locally appropriate health support, resources, and services for regional communities.

11:30am – 12:00pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Building farmers' resilience through online community professional development

Dr John Bennett (University of Southern Queensland), Dr Nick Kelly (University of Southern Queensland), Dr Ann Starasts (University of Southern Queensland)

To enhance rural productivity and build rural resilience to a dynamic climate and business environment, farmers must undertake professional development (PD) in some form. This is well understood by all stakeholders, including farmers, industry bodies, extension groups, agronomists, researchers and governments. However, a major hurdle facing agriculture is

geographical dislocation from centralised professional development, extension services and educational institutions; particularly as properties become larger in order to remain viable. A further hurdle is allotting time for structured professional development (PD). Whilst ICTs in agriculture have been viewed as a tool for disseminating information, there is a strong push towards the potential for ICTs to facilitate learning through human interaction to address these hurdles. In other sectors, PD is increasingly being addressed through digital means such as online courses, or distance education. The School of the Air uses a similar model in regional areas. However, the time required for interaction is still structured. With recent advances in telecommunications, and their affordability, the agricultural industry is postured to take advantage of a digital rural future. In this paper we propose specific technologies be developed to allow agricultural industries to undertake PD in their own time via development of strong digital communities of practice. We have been developing connected learning based software platforms, which could easily be adapted to agriculture through a program designed to heavily involve farmers and other agricultural stakeholders in the development. This will empower initial communities and produce a useful functional digital platform. Integral to this is digital literacy in rural communities within specific industry communities. An example of a successful community in India is drawn upon. The contribution of the paper is to describe an approach to building rural resilience through online PD and present work done to date in this area.

11:30am – 12:00pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Educating Australian high school students in relation to the digital future of agriculture: A practice report

Dr Robert Whannell (University of New England), Ms Amy Cosby (University of New England), Professor Steve Tobias (University of New England), Dr Mark Trotter (University of New England), Professor David Lamb (University of New England)

This presentation describes the steps being taken at a regional university to address two related needs in the Australian rural context: the lack of tertiary qualified graduates in the Australian agriculture industry and the deficit of qualified science and mathematics teachers in rural locations.

The Australian agriculture sector includes 7% of workers who are tertiary qualified, compared with 25% for the national workforce. This situation is exacerbated due to tertiary institutions providing 800 graduates each year to meet an estimated demand of 2000. With the increasing challenges of a steadily growing population and Australian climatic conditions, the best use must be made of the agricultural resources available through the use of digitally based precision agriculture by people appropriately qualified in mathematics, science and information technology. The number of students studying science and mathematics has been declining at both the secondary and tertiary levels of

education. This decline is also being seen in the number of qualified science and mathematics teachers, with particular shortages evident in many schools in rural centres.

In an attempt to address these challenges, the University of New England has developed a number of engagement strategies targeting high school students centred on the SMART (sustainable, management, and accessible rural technologies) Farm that highlights the use of the latest technology to improve productivity. The initiatives include student outreach programs in science and agriculture and the development of an interactive digital classroom to engage junior secondary mathematics and science students.

These initiatives are often the first time students come into contact with the term 'precision agriculture' and the underlying mathematics, science and information technology involved. The success of the program is evidenced by an increase in enrolments in agriculture-based courses at the university of 10-15% per year in the three years since the initiative was commenced.

11:30am – 12:00pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Enabling Indigenous education success beyond regional borders

Professor Bronwyn Fredericks (CQUniversity), Dr Ross Skinner (CQUniversity), Ms Bronwyn McFarlane (CQUniversity), Dr Pamela Croft (CQUniversity), Ms Sandra Creamer (CQUniversity), Ms Julie Mann (CQUniversity)

Geographical and social isolation have often been linked to the 'success', or rather 'non-success', of Indigenous Australian students. What if their geographic location and social situation were seen as supportive mechanisms? What if their culture, local community and extended family networks were seen as strengths in their learning journeys? What if their home and community environments were understood as platforms for learning? The Tertiary Entry Program (TEP), offered by the Office of Indigenous Engagement at CQUniversity, was a face-to-face on campus enabling/bridging program offered to Aboriginal and Torres Strait Islander students in Central Queensland. It is now an external, flexible, on-line learning program offered to Indigenous Australians in urban areas, regional and remote communities and in correctional centres. It is no longer governed by the regional borders of the region in which it was developed, and enables Indigenous Australians throughout Australia to develop confidence, affirm their identity and take pride in being who they are as Indigenous peoples. The program builds the knowledge and skills to achieve within a university environment and allows Indigenous students to achieve their goals regardless of their geographic and social location. This presentation will not only demonstrate how Indigenous learners are using digital technology to study from within their communities, but are progressing successfully from their enabling program through to graduation.

11:30am – 12:00pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

The challenges of delivering high speed broadband infrastructure in rural and regional Australia: A case study of Western Downs Regional Council (WDRC)

Dr Michael Lane (University of Southern Queensland), Mr Sanjib Tiwari (University of Southern Queensland), Associate Professor Margee Hume (University of Southern Queensland), Mr Peter Greet (Western Downs Regional Council)

Telecommunications access in the rural and regional areas of Australia has come under considerable scrutiny in recent years. Due to the vastness of geography, and low population densities in rural and regional areas with a low demand level, telecommunications companies are reluctant to invest in digital telecommunication infrastructure. Rural and regional areas are identified as a major source of Australia's export earnings and contribute significantly to the GDP of Australia. However, rural and regional communities on the whole tend to have a lower socio-economic status and many residents are unable to afford expensive telecommunication services. Hence the digital divide between urban and rural and regional Australia exists because of the lack of investment in digital telecommunications infrastructure and the lower socio-economic status of rural and regional Australia.

Our study indicates that the current broadband Internet infrastructure does not provide adequate coverage for rural and regional communities in WDS. Mobile networks do not have the current capacity to handle the load of data traffic at peak times due to the thousands of CSG mining workers currently working across WDS. Moreover Mobile networks have patchy coverage with many black spots across WDS. In many smaller towns mobile network signal is poor and/or unreliable. Larger towns are well serviced by ADSL/ADSL2+ but there are still problems with speed and reliability of service. Many smaller towns do not have ADSL enabled telephone exchanges. Satellite broadband Internet is only available to households who do not have access to Broadband Internet services such as ADSL/ADSL2+ and 3G/4G Broadband Internet.

There has been little in-depth work on broadband Internet infrastructure in rural and regional areas such as WDS. This presentation will critically review the current broadband Internet infrastructure and its limitations and provide suggestions to improve broadband Internet access in rural and regional communities living in WDS.

12:45pm – 1:45pm

Keynote Presentation: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Reflections on regional futures

Dr Wendy Craik AM (Productivity Commission)

What makes regions successful and resilient? Factors that influence regional success and resilience include not only the natural, human and technological resources of an area, but also how government policy and local capability combine with those resources. A range of factors and their influence, including leadership, competitiveness, and risk management, will be discussed.

1:45pm – 2:15pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Not all Mbs are created equal: The experience of being on the margins of information access

Ms Michele Berkhout (RCS Telecommunications)

Integrated with statistical charts and census data as a function of socio-economic characteristics, this ethnographic presentation will provide context-aware insight into the digital experiences for seven regional businesses in the Western Downs, providing community narrative to the data. It challenges the narrow presumptions about what defines the digital experience, showing that when used in the right context, ICT in the region has had a dramatic impact on achieving specific social and economic business objectives by improving communication and the exchange of information. The study shows the range of Internet-enabled, connected devices, being used to integrate their digital experience and conduct business using fit-for-purpose connectivity solutions that meet their immediate needs. However, as we accelerate towards an all-IP environment, marked by the hyper-connectivity of people and machines, the spectre of an accelerating digital divide looms – businesses are constrained in their ability to take advantage of ICT and reach their economic potential by access and digital literacy where re-conceptualising their businesses for hyper-connectivity is not universal.

The study highlights the bottleneck to the constriction of the infrastructure is not just technological but also regulatory as the creative application and integration of existing technologies into new business models can enable access for digital inclusion.

The presentation therefore concludes with an invitation to develop an industry-agnostic digital connectivity partnership focussed on integrating ethnographic research with big data analysis, social and physical network design test-cases for limited-access geographies and provide literacy narratives that highlight participatory possibilities and so ignite rapid regional prototyping if given symmetrical, reliable high-speed connectivity.

1:45pm – 2:15pm

Parallel Session: Regional Futures

Venue: Toowoomba Regional Council Room, R113

Understanding digital and social inclusion in regional Australia

Associate Professor Khorshed Alam (University of Southern Queensland), Dr

Sophia Imran (University of Southern Queensland)

The aim of this research is to understand what challenges refugee migrant communities encounter in adopting high-speed broadband Internet services and how they affect their social inclusion in the wider community. The research was conducted in the regional town of Toowoomba in the state of Queensland, Australia. The empirical data that informs this research is derived from a series of focus group discussions with 27 refugee migrants that were conducted by the authors. Thematic analysis was employed to identify key themes from the four discussion groups. The research indicated that there was a digital divide in the refugee migrant groups that was specifically related to income, mobility and isolation. This paper identified links between the concepts of digital inclusion and social inclusion in terms of access to information, communication with friends and family, using e-services, and education and employment opportunities. Lack of access to information and communication technologies and an inability to use them effectively in migrant communities can create conditions and barriers that risk generating social exclusion, alienation and marginalisation.

1:45pm – 2:00pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Real-time control approaches for site-specific irrigation and fertigation optimisation

Dr Alison McCarthy (University of Southern Queensland), Dr Tai Nguyen

(University of Southern Queensland), Professor Steven Raine (University of Southern Queensland)

Automated irrigation and fertigation site-specific control systems offer labour and water savings, and crop productivity improvements for growers, where spatial variability of water requirements exists within a field. Real-time irrigation control strategies for surface and pressurised irrigation systems have been developed that adapt to infield soil and plant measurements collected in real-time. 'Sensor-based' control strategies directly use measurements to make irrigation decisions; and 'model-based' control strategies use a model (often calibrated with sensor input) to aid irrigation decisions. Model-based control strategies can aim for specific end of season characteristics. However, model-based control strategies often use off-the-shelf, black box industry models that may not be updated with the development of the new varieties, and may not consider all the soil-plant-water relations.

A hybrid Artificial Neural Network (ANN) and Bayesian model is being used for training and predicting crop dynamics based on historical and real-time in-field data. A game theory and artificial intelligence-based approach will provide an in-built self-learning capability for new crop conditions to achieve site-specific irrigation optimisation and real-time adaptive control. This paper will present an overview and comparison of the adaptive control approaches for irrigation and fertigation, and considerations for their use under commercial conditions on surface and pressurised irrigation systems.

1:45pm – 2:00pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

On-line farm trials: A research repository for Australian grain growers

Mr Robert Milne (Federation University Australia), Mr Peter Dahlhaus (Federation University Australia), Mr Cam Nicholson (Nicon Rural Services), Dr Helen Thompson (Federation University Australia), Mr Andrew MacLeod (Federation University Australia), Mr Paul Feely (Federation University Australia), Mr Tom McCue (Grains Research and Development Corporation), Ms Jennifer Corbett (Federation University Australia), Mr Heath Gillett (Federation University Australia)

Field based agronomy trials in Australia are highly valued by growers, researchers and advisors to support decision making to improve productivity and efficiency of cropping systems. Most trial information and results are currently accessible only in hardcopy format or as an electronic copy of the original report.

On-farm research trials are designed to test one or more variables, such as crop variety, time of sowing, fertiliser or herbicide application, stubble management or other treatments. Regional grower groups undertake the majority of on-farm trial research, which provides agricultural communities with specific and relevant information on crop production methods and strategies.

The Online Farm Trials Research project, funded by the Grains Research and Development Corporation (GRDC), aims to provide improved and enhanced access to historical and future farm trials information using online systems. Through the development and implementation of innovative technology, this project will unlock knowledge benefits of farm trials research for a wide audience. Australian grain growers will have rapid and efficient access to trial information and data to assist them in responding to priorities such as farm profitability and sustainability, climate change, natural resource management and bio-security.

The primary objectives of this research are to use digital technologies to:

- Provide grain growers, advisors and researchers with greater access to accurate, regionally relevant farm trial information;

- Establish better methods and tools for identification and understanding the opportunities, risks and potential impacts of key farming practices;
- Improve grower and industry adoption of knowledge management, spatial research and other innovative technologies; and
- Build skills and capacity for advancing profitable farming systems.

The ultimate aim is to support effective competition by Australian grain growers in global grain markets, through enhanced profitability and sustainability.

1:45pm – 2:00pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

The digital divide and conquer: Structural barriers to digital emancipation

Dr Amy Antonio (University of Southern Queensland), Mr Glen Parkes (University of Southern Queensland)

A recent JISC report argued that digital information literacy skills—the ability to communicate effectively via digital media and to judge the validity and reliability of online information—are increasingly required to live and work in a (digital) society. While these competencies have been recognised as essential for employability, a pilot study conducted at Griffith University in 2014 revealed that a vast majority of students are not comfortable searching for, analysing, re-using or citing information they find online. This raises questions about whether or not the teaching of digital information literacy skills should be embedded within Higher Education curriculum per se, and what such an immersion might look like.

Initiatives aimed at improving the participation of students within Higher Education by cultivating relevant digital literacy practices are starting to emerge. We must however be wary of technology-driven pedagogies in an ever-changing digital landscape, which do not situate such literacies beyond a “closing the gap” perspective. Such approaches assume a ubiquity of access to and use of both digital technology and high speed broadband on which these technologies depend in order to be utilised effectively (noting the problematic inferences inherent in the use of such language). Digital literacy requirements and capabilities can be a means to both encourage participation and gate keep non-traditional participants within Higher Education. This presentation seeks to explore digital literacies, often touted as a barrier negating panacea to success within formal learning, from the situated reality of difference – the digital divide and conquer.

1:45pm – 2:00pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Digital futures for rural nurses: Improving access to post graduate education with mobile devices

Ms Sharon Rees (University of Southern Queensland)

Although online learning has addressed some of the educational needs of rural nurses, there are still considerable difficulties relating to ease of access, competing time demands and the need for flexibility. Mobile learning has the potential to address these issues while still delivering the benefits of connected learning. This paper discusses the potential of mobile learning to alleviate the issues uniquely encountered by nurses working in regional, rural or remote areas.

Access to education is an issue for all nurses and, in particular, for rural nurses. Rural nurses need access to a broad range of continuing education options due to the broad diversity of patient health issues they could potentially face. The rural nurse needs skills to deal with major trauma, as well as patients with chronic disease, mental illness and much more. Whereas nurses in larger hospitals have the support of peers and will often specialise in only one area, rural nurses operate with little peer support. The rural nurse therefore needs access to a variety of educational opportunities.

Mobile learning could alleviate many barriers to education for these nurses, allowing them greater opportunities for relevant education. For example, mobile applications (or apps) on phones or tablets could enable quick access to information about best practice, processes or procedures. Mobile technologies could also be used to connect these nurses to others in similar environments, enabling them to build communities of practice based around their educational needs, and further increase opportunities to leverage the benefits of mobile learning.

This paper reports on a research project that is looking at those barriers and enablers to providing continuing education through mobile devices to nurses.

2:00pm – 2:15pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Controlling surface irrigation using digital devices

Dr Jasim Uddin (University of Southern Queensland), Dr Rod Smith (University of Southern Queensland), Dr Malcolm Gillies (University of Southern Queensland),

Furrow irrigation is widely used and is the most popular irrigation method for row crops. In Australia this method is widely used (about 95%) for the irrigation of cotton, although it is labour intensive and traditionally has had low water use efficiency due to the significant amount of water loss through deep drainage and runoff. However, it is reported that a well-designed and managed furrow irrigation system may have application efficiencies up to 90% to 95% that would be similar to other more energy intensive efficient irrigation systems. Towards this, the National Centre for Engineering in Agriculture (NCEA) has been playing a leading role in the world by making a significant improvement in efficient furrow irrigation. Recent research at NCEA has established the foundation for the real-time control of furrow irrigation. It has developed the concept and tested the software required for the real-time optimisation and has shown its capability of sensing the inflow and advance, simulating the irrigation, and predicting the optimum time to cut-off without any user intervention. In partnership with technology company Rubicon Water, the NCEA has

developed a smart automation system for controlling furrow irrigation using Internet connected latest digital devices like smart phones, iPad, laptop or desktop from anywhere in the world. It involves flow control infrastructure, advance sensors, control software and wireless communications. Currently the NCEA is demonstrating this system in various locations in cotton growing regions across Australia through a project funded by the Cotton Research and Development Corporation. The preliminary results show the potential of the system to save significant labour and water, although there remain some limitations in water delivery system.

2:00pm – 2:15pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

ICT usage and agricultural productivity: Evidence from the Australian broadacre agriculture

Dr M S Arifeen Khan Mamun (University of Southern Queensland), Dr Ruhul Amin Salim (Curtin University)

Though applied research regarding the contributions of information and communication technology (ICT) to productivity in manufacturing and service sector firms are voluminous, piecemeal literature is found that investigates the contributions to agricultural sector firms. The present research is an initiative to add new knowledge to the past studies. The novel contribution of the paper is that we use Nobel Laureate Amartya Sen's theory of capability and functioning as the theoretical framework. In our research we investigated the effects of expenditure for telephony on agricultural revenue (or cash receipts) at the state level in Australia. The paper uses time series panel data drawn from the Australian Department of Agriculture covering 22 years. A Cobb-Douglas type of revenue function is estimated by pooled group regression and mean group regression estimators. Empirical evidence from the study shows that, in Australian broadacre agriculture, both short-term and long-term contributions of the uses of telephony that are measured by income elasticity of the telephony are positive. Our estimated long-term income elasticity telephony is 0.25. Furthermore, the estimated long-term effects are greater than the estimated short-term effects. Therefore, the study indicated the potential of digital connectivity, through mobile phones, land phones, or computers, to bring substantial benefit to farmers in Australia.

2:00pm – 2:15pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Digital learning without Internet access in regional, rural and remote Australia: Prospects and possibilities

Dr Helen Farley (University of Southern Queensland), Dr Angela Murphy (University of Southern Queensland)

The use of the Learning Management System (LMS) in education has permitted educators to move beyond the restrictive physical boundaries of traditional classrooms and provide learning experiences that are personalised and focused on student needs. Unfortunately, the increasing reliance on the LMS and other digital technologies is based on the assumption that students have ready access to the Internet and appropriate technologies, which is often not the case. Consequently, there is an increased risk of further excluding disadvantaged students without reliable access to the Internet from engaging in learning opportunities.

This paper reports on a number of projects at the Australian Digital Futures Institute at the University of Southern Queensland (USQ) that have developed a version of USQ's LMS called Stand Alone Moodle (SAM) which does not require the Internet. At the moment, this technology is being trialled in prisons where students do not have access to the Internet. The project team is confident that this technology can also be used in those areas of rural, regional and remote Australia where Internet access and data network coverage is problematic.

Higher education institutions are increasingly incorporating e-learning and digital technology initiatives in order to remain competitive in modern knowledge-based economies. The use of technology has become essential in the delivery of distance education courses, largely in response to an emerging demand for flexibility in learning. SAM does not require access to the Internet yet still enables students to participate in courses electronically. Students enrolled in distance education courses that have previously relied on paper-based course materials will benefit from the resources, activities and support available to students who are able to access the Internet, thereby improving the quality of the student learning experience.

2:00pm – 2:15pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Getting the most out of connectivity tools in rural and remote communities

Ms Amber Marshall (University of Queensland)

Connectivity is essential to the future of rural and remote communities. For most of us, the tools (applications, programs, interfaces) that mediate the connection determine what we see, hear and do when we connect. But connectivity tools do not just enable us to connect; they also constrain how we interact with each other in various ways. For example, it is much easier to express mood and emotion using video-based tools (e.g. Skype) than with text-based tools (e.g. email). Of course, there are also hardware-related constraints such as bandwidth.

While technologists design connectivity tools with particular uses in mind, and with fixed capabilities, the ultimate usefulness of these tools is determined by how people actually use them. Users' technical competence is an obvious factor; learning how to use the tool in prescribed ways is critical. But we may also innovate and use these tools in ways unintended by the creators. For example, disaster victims have used Facebook and Twitter

to share critical information and resources in real time and, as a consequence, response organisations now include social media in their communication plans. In this way we, as users, have great power in determining how we use and experience connectivity tools.

This presentation will explore a range of connectivity tools that support communication and collaboration activities in business and education. Namely, we will investigate how enterprise social networks (ESN), telepresence (video) and 3D virtual worlds enable and constrain our experience of connectivity. On the other hand, we will also look at novel uses for these tools and strategies for getting the most of them. The premise of this presentation is that, as rural and remote educators, researchers, practitioners, and community members, the onus is on us to maximise our experience of connectivity instead of only relying on the built-in capabilities of tools and prescribed ways of using them.

2:15pm – 2:45pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Firms' use and performance of ICT: Perspectives from regional Australia

*Dr Md Shahiduzzaman (University of Southern Queensland), Associate Professor
Khorshed Alam (University of Southern Queensland)*

While Information and Communication Technology (ICT) is considered as a panacea for economic growth and development, there is little research that focuses on its use and performance for rural and regional businesses. ICTs help to diminish the negative effects of distance, increase access to information, provide a better provision of services and explore market potentials. ICTs are now recognised not only as a tool for information processing but also as a General Purpose Technology to promote business innovations, growth and productivity. Nonetheless, rural areas are often characterised as information poor due to lack of adequate ICT provision, infrastructure and capacity. Prior research identified a number of factors, such as organisational characteristics, lack of complementary investment and capability maturity level that might affect ICTs' pay-offs for businesses. An adequate understanding of these fundamental issues is essential to design and implement effective policies for rural and regional development. This study examines the usages and effects of ICT on the business performance of small and medium scale enterprises (SMEs) in regional Australia. The diversity of businesses in any regional location determines its resilience against downswings in economic activities in that location. Nonetheless, they face significant challenges on infrastructure provisioning, skill shortage, communication and others. Challenges have emerged in recent years that call for better integration of ICTs into businesses' organisational structure and service delivery. This study explores these issues by considering a case for SMEs in the Western Downs Region in Australia. Primary results indicate that ICT investments and Internet use are positively correlated with SMEs' economic performance but the relationship differs widely across firms and industries. The findings from the study provide credence to policies that seek to stimulate performance of rural businesses so as to foster regional economic development.

2:15pm – 2:45pm

Panel Session: Regional Ageing

Venue: Toowoomba Regional Council Room, R113

Circuitous literacies in the cultures of regional ageing

Dr Lisa McDonald (University of Southern Queensland)

This exploratory discussion focuses on the often unexpected and indirect arrival of new digital technologies in the lives of older regional Australians. Such an arrival can be greeted with distrust and bemusement, later materialising into wonder and delight. Heightened interest in tablet devices, for example, now constitutes regular over-subscription to local technology classes for the ‘actively retired,’ while, at the institutional level, new digital communications strategies are re-shaping understandings of the ageing subject in both aged and general health care. Yet variations in the quality of digital connectivity in regional Australia have intensified familiar distinctions between centres and peripheries and, therefore, the boundaries between regions and cities. In similar ways, understandings of literacy are no longer tied to the written word, nor singular in meaning, giving into sites for reading which are multimodal and multivocal. It is therefore timely, as well as heartening, to have encountered instances of determined innovation emerging from within these disparate affordances in the lived experiences of older Australians. What indeed constitutes ‘smart ageing’ in a digital world?

Older adults’ digital engagement: A regional case study

Dr Mark Tyler (Griffith University), Dr Linda De George-Walker (CQUniversity), Professor Patrick Danaher (University of Southern Queensland)

As folk move toward their latter years, they may experience acute complications in the process of ageing well. There has been evidence to suggest that digital technologies have the potential to improve opportunities for older adults to socialise, access services and learning, and in turn improve their quality of life and enhance social capital. Some studies indicate that the fastest growth in uptake of technology is occurring in older adult cohorts. Yet, these benefits may be accruing for relatively few older adults as the digital divide fails to narrow to any significant degree with older adults continuing to experience lower levels of digital technology use compared to younger people. Therefore, it is imperative that we seek to more fully understand what influences older adults’ digital participation, including issues associated with the heterogeneity of older adulthood and technology access, but also choice and motivation.

This paper reports the findings of pilot research undertaken with retirees from a regional centre in Southeast Queensland. Using a mixed methods approach, the paper provides an account of the instrument design, and gives a preliminary perspective on the differences between participants. The paper explores the territory of the users and non-users, and highlights the barriers to using digital technologies. The findings illustrate the position of various social and personal factors and how they play out in the levels of digital engagement by older adults.

Caring for seniors: A remote access approach providing support and comfort for seniors and carers

Dr Jacqueline Blake (University of Sunshine Coast), Associate Professor Don Kerr (University of Southern Queensland)

In Australia, 50% of people over 61 experience loneliness and 26 to 29% are chronically lonely (Franklin et al. 2008, p. 10). Loneliness is associated with higher stress ratings, an increased risk of cardiac deaths (Hawkey et al. 2003), depression (Cacioppo et al. 2006) and other psychiatric disorders such as schizophrenia (House et al. 1988). The resultant reduced physical activity (Hawkey et al. 2009) is also associated with increased mortality (Hawkey et al. 2003). Depression alone results in up to a 50% increase in general medical expenses (Druss et al. 1999) with the lonely reporting their health as twice as bad as those who are not lonely (Easton 2011). However, Umberson and Montez (2010) report that an increase in social relationships is associated with significant benefits to lonely people and these benefits include being healthier and living longer.

Reducing loneliness can be difficult in rural and remote communities and technological solutions may be the only way to improve the situation. The European funded project VictoryaHome uses a monitoring device with virtual presence capabilities in the home of independent seniors. The monitoring device allows family or carers living away from the senior to socialise via a video and voice communication mechanism that may be initiated by either party, potentially alleviating loneliness. This monitoring device also enables day-to-day sharing of care routines such as medication adherence, fall detection, dehydration prevention and activity monitoring. This monitoring approach implies that family members living away from the person can still play a role in their day-to-day care and allows the senior to play an active role in their extended family life. The use of this monitoring and virtual presence device may allow seniors to safely stay in their rural communities maintaining current social contacts.

2:15pm – 2:45pm

Panel Session: Precision Agriculture

Venue: NCEA Room, L206

UNE SMART Farm: Eight dimensions, one farm. A project update

Professor David Lamb (University of New England), Dr Mark Trotter (University of New England), Professor Iain Young (University of New England), Professor Aron Murphy (University of New England)

The “SMART” in SMART Farm represents a vision to deliver Sustainable, Manageable and Accessible Rural Technologies on farms, which enhance the business and lifestyle of farming.

Culminating in the opening of the new SMART Farm precinct, located on the nearby university-owned “Kirby Farm”, in December 2014, the SMART Farm project draws on 8 inter-related projects. This presentation will outline these dimensions, including:

1. The SMART Farm precinct building;
2. Establishing 5 different modes of external connectivity to the farm environs;
3. The NSW Strategic Science Leverage Fund project “Real time monitoring of pastures using NBN platforms”;
4. Establishing a telemetry backbone and in-situ sensors across the SMART Farm. The data streams will be telemetered directly into the SMART Farmhouse (via a 30 metre receiving antenna located near the SMART Farmhouse);
5. Developing a web architecture/platform to host data;
6. Installation of a triple-junction, concentrating solar array for testing new solar panel technology for rural Australia;
7. The Australian Maths and Science Partnership Program (AMSP) RUN Digital Classroom activity for developing SMART Farm Learning Materials; and
8. The global SMART Farm as a component of UNE’s Future Campus initiative.

2:15pm – 2:30pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Estimating the value of conjunctive water use at a system-level using nonlinear programing model

Dr Duc-Anh An-Vo (University of Southern Queensland), Dr Shahbaz Mushtaq (University of Southern Queensland), Dr Kathryn Reardon-Smith (University of Southern Queensland)

Uncertainty and shortages of surface water supplies, as a result of global climate change, necessitate development of groundwater in many canal commands. Groundwater can be expensive to pump, but provides a reliable supply if managed sustainably. Groundwater can be used optimally in conjunction with surface water supplies. The use of such conjunctive systems can significantly decrease the risk associated with a stochastic availability of surface water supply.

We propose an innovative nonlinear programing model for the optimisation of profitability and productivity in an irrigation command area, with conjunctive water use options. The model, rather than using exogenous yields and gross margins, uses crop water production and profit functions to endogenously determine yields and water uses, and associated gross margins, respectively, for various conjunctive water use options. The model allows the estimation of the potential economic benefits of conjunctive water use and derives an optimal use of regional level land and water resources by maximising the net benefits and water productivity under various physical and economic constraints.

The proposed model is applied to the Coleambally Irrigation Area (CIA) in South Eastern Australia to explore potential economic benefit of conjunctive water use. The results show that optimal conjunctive water use can offer significant economic benefit, especially at low levels of surface water allocation and pumping cost. At lower levels of surface water allocation the results show that conjunctive water use potentially generate additional AUD 57.3 million. On the other hand, at higher levels of surface water allocation, additional

benefit of conjunctive water use is AUD 9.4 million. The model could be applied to other irrigation systems to maximise the potential of conjunctive water use.

2:15pm – 2:45pm

Panel Session: Social Media

Venue: DSITIA Room, C204

Why bother? (With social media)

Dr Jenny Ostini (University of Southern Queensland), Mr Neil Martin (University of Southern Queensland), Dr Amy Antonio (University of Southern Queensland)

It seems as if everyone is doing social media and that if you're not part of the digital world, you're a dinosaur. Rather than just doing social media for the sake of it, this is a session about deciding whether you need to do social media, how to decide what to do and the resources you will need to do it. We will also talk about how to work out if what you are doing is successful and what, if anything, you should be doing instead.

What problem are you trying to solve? What problems do your customers/clients/target group have? How can you make them feel as if they can do something they haven't done before?

How do you know whether you are succeeding or failing at achieving your goals?

Participants will receive a brief introduction to a range of social media that can be used in their businesses and research. Specific digital media will be discussed, and played with, in the context of understanding the purpose and outcomes achievable through their use. Case studies from different sectors will be used to examine different approaches and audience groups.

Participants will be able to get more in-depth help, display their learning and earn digital badges by going to a website linked to the conference site after the conference.

An investigation of social media's roles in agricultural knowledge practices

Mr Tom Phillips (OneFarm, Centre of Excellence in Farm Business Management, New Zealand), Associate Professor Laurens Klerkx (Wageningen University, Netherlands)

There is widespread dissatisfaction with traditional models of agricultural extension that focus on the linear movement of knowledge to narrowly defined farmers. The simplicity of these 'technology transfers' fails to recognise the complexities of farming systems. In response, the Agricultural Innovation Systems (AIS) literature highlights open-ended participation by a broad and heterogeneous rural community. Such participation requires equitable partnerships that are able to share and reflect upon practices. The learning embedded in AIS builds new networks that collaborate for change. As such, learning moves from multiple and singular meanings toward shared and plural understandings. Social media (SM) such as Twitter and Facebook are new communication tools for rural communities. However, there has been significant uptake and SM is being used to enhance

farming decisions in numerous domains. As an emergent field with limited literature, there is a need to understand more about the role SM plays in farmer decision-making and agricultural innovation more broadly. Little is known about differences in participation between farmers and rural professionals or about learning processes and knowledge creation in these virtual spaces. Does SM create spaces where participants engage on an equitable, trust forming and self-directed basis? What is the composition and global reach of these media networks? How rapidly and flexibly do they form, disband and reconfigure? This paper outlines a research programme designed to address such questions and presents some preliminary results that suggest the significant role that SM can play in agricultural knowledge practices.

2:15pm – 2:45pm

Panel Session: Participatory Research

Venue: ADFI Room, S108

Panel session and workshop outline: Participatory research in rural digital projects

Mr Gregor Edeson (University of Tasmania), Dr Greg Timms (University of Tasmania), Ms Brigid Morrison (University of Tasmania)

The panel will present on experiences from Sense-T's research program and the workshop will address the following questions:

- What works well in participatory research in rural digital projects? Why?
- What are the potential benefits of community big data assets and data sharing?
- At what point does participatory research end? How can its outcomes be made self-sustaining?

2:30pm – 2:45pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Simulation of monolayer distribution for evaporation reduction on dams

Mr Matthew du Preez (University of Southern Queensland), Dr Andrew Wandel (University of Southern Queensland)

Water security is a large problem in Australia and is predicted to worsen as demand for water increases and the average temperature rises due to climate change. Many different methods are being investigated to solve this problem. One method of reducing water evaporation from dams is to apply a monolayer film to the water surface. The monolayer reduces evaporation by reducing the surface tension of the water, which reduces the size of the capillary waves. It also increases the size of the thermal boundary layer. Laboratory testing has shown that monolayers are capable of reducing evaporation but it is unclear if they are cost effective over longer periods of time. The cost effectiveness is not clear because it has been difficult to predict the monolayer distribution after several months. A computer model has been developed to investigate this distribution and the cost

effectiveness using real weather data. The monolayer has been modelled as particles that are moved across the water surface by the wind and the effectiveness of the monolayer in a location can be assessed by the total amount of monolayer present there. This method can readily incorporate effects that degrade the effectiveness of the monolayer such as biological attack and submergence. The value of the water saved, and cost of the monolayer applied, determines when to apply the monolayer. The best and worst case scenarios are investigated to determine if monolayers are a cost effective method of water evaporation reduction.

3:00pm – 3:45pm

Invited Speaker: Digital Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Harnessing powerful learning through powerful technology: How high speed broadband access has facilitated a transformational change in learning

Ms Janelle Reimann (Principal, Willunga High School)

Willunga High School was the first government school on mainland Australia connected to the National Broadband Network (August 2011). Situated in the picturesque McLaren Vale in South Australia, Willunga High School has been able to harness the power of high speed broadband to bring about a transformational change in teaching and learning. Enthusiastic school community members have embraced the change, been challenged to go beyond their comfort zones and to think differently, which has resulted in inspirational learning. The walls of the classroom “virtually” disappear, learning spaces and opportunities are seamless, and we have only been limited by our imaginations as to what we can achieve. Teachers believe they are no longer the holders and deliverers of all knowledge and content, they are now the sculptors and artisans of a new way of learning by using powerful learning and technology to unlock everyone's learning potential. In this presentation you will hear how a government school with very limited resources has been able to utilise technology harnessing the power of the high speed broadband to bring about whole school change which has revolutionised the very fabric of learning and changed the relationship between teacher and learner. The learner is now fast tracked to a level of what they can do and what they want to know and learn!

3:45pm – 4:00pm

Grains Research and Development Corporation Presentation

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

eXtensionAUS pilots in the Australian Grains Industry

Gavin Beever (Managing Consultant ORM Pty Ltd, GRDC eXtensionAUS National Project Manager)

This pilot is trialling the applicability of the eXtension model from the United States to the Australian grains industry. It has commenced with a specific and applied focus on the fields of crop nutrition and crop pathology.

Regional Futures, Agricultural Futures, Digital Futures

In the USA, eXtension is a national Internet based educational network which is integral to and complements their community based Cooperative Extension System. It provides an interactive online learning environment that aims to deliver the best, most researched knowledge from the best knowledge sources to the consumers who need to use it, with 24/7/365 day availability.

The national eXtensionAUS pilot has been initiated by the Grains Research and Development Corporation (GRDC) and the Department of Environment and Primary Industries (DEPI) with the support of Grains Industry National Research, Development and Extension Committee. It is being delivered in partnership with the USA eXtension foundation and the United States Department of Agriculture.

The two learning networks are being project managed by DPI NSW (Field Crop Nutrition) and DEPI Victoria (Field Crop Diseases).

The face of extension, information exchange and decision support service is rapidly changing. The Grains Industry recognises it needs to consider new opportunities that can bring about improved outcomes for farmers and the greater industry. The opportunity for real time information exchange between farmers, researchers and the industry more broadly has been recognised as well worth exploring.

With an increasingly connected agricultural community that is embracing new technologies as infrastructure and bandwidth improve, prospects for harnessing e-systems improve daily. This pilot will test the potential of on-line systems to promote collaboration, facilitate the creation of virtual communities and promote knowledge transfer and technology adoption via closer and more immediate levels of engagement between stakeholders.

4:00pm – 4:30pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Comprehensive universities and their contribution to regional resilience: The collective impact of dual-sector education, research and engagement

Dr Susan Kinnear (CQUniversity), Ms Karen Seary (CQUniversity), Ms Katrina Maynard (CQUniversity), Ms Lisa Curtis (CQUniversity)

Regions are complex systems that become more resilient when they feature diversification, innovation, and a strong capability for self-determination. Many studies have already illustrated the role that regional universities play in driving the development of their local communities. This paper extends the current literature with analysis and commentary specifically focused on comprehensive (dual-sector) institutions. It explores how these universities can uniquely shape regional futures, through their ability to concurrently offer supported pathways amongst Higher Education and vocational education; access to applied research and innovation; and community engagement activities. The potential advantages and disadvantages of this model are briefly examined in terms of human capital development across diverse skilling ecosystems; economic advantages associated with increased participation and productivity; and social innovation through improved

leadership and governance. In turn, the overall implications are then considered against a matrix of the key challenges currently being faced by Australia's regional areas, including managed population growth, better social cohesion, and responding to technological development, globalisation and structural adjustment.

4:00pm – 4:30pm

Parallel Session: Digital Futures

Venue: Toowoomba Regional Council Room, R113

An app for Australian grain farmers that estimates the soil water status of paddocks

Dr Brett Robinson (University of Southern Queensland), Dr David Freebairn, Dr David McClymont, Professor Steven Raine, Mr Victor Skowronski, Dr Alison McCarthy, Dr Jochen Eberhard

Soil water supply is the largest constraint on grain production in Australia, and producers are increasingly moving from rainfall to soil water as their yield predictor. However, soil water is difficult and expensive to measure, and measurements are not necessarily more accurate than the results of modelling. In response to these factors, we are developing an iPhone and iPad App for estimating soil water content by simulation modelling, and we have a working prototype in limited use.

The App integrates information about the weather and climate (BoM) and soils (in the App) and farm management (selected by the user). These three elements have been available to scientists for many years, but the App allows them to be combined in powerful ways by decision-makers. Soilwaterapp is superficially simple, but it contains hundreds of mathematical functions in a detailed, daily time-step water balance used to estimate the current status and compare it with the equivalent situations estimated from 50 years of the site's climate record. Projections into the future are also based on a 50-year climate record. These simulations take only 3 seconds on an iPhone and even less on an iPad.

Field evaluation and evaluation against data from past experiments will establish the accuracy and reliability of the App. We are working with technicians and growers across Australia to provide software that meets their needs as much as possible. Our website is www.soilwaterapp.net.au.

4:00pm – 4:30pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Virtual world technologies provide new options to support climate risk decision making in agricultural production systems

Dr Kate Reardon-Smith (University of Southern Queensland), Dr Helen Farley (University of Southern Queensland)

Digital technologies already serve an important role in the delivery and communication of agricultural information, complementing and expanding the reach of conventional extension services. However, sophisticated digital platforms and their applications in learning environments offer new opportunities that may significantly enhance agricultural knowledge exchange.

This paper reports on a project that uses cutting-edge advances in virtual world technologies to develop web-based virtual 'discussion-support' tools for the rapid sharing of targeted climate information. These tools are designed to provide a stimulus for discussion, enhanced decision-making and improved climate risk management on farms. The project uses the Second Life virtual world environment to create customised scripted video clips (machinima). These feature real world settings and lifelike avatar actors who model conversations about climate risk and key farm operational decisions relevant to the lives and practices of specific groups of farmers. The system has been trialled with Indian cotton farmers and Australian sugarcane farmers. Further large scale evaluation in a range of agricultural systems will inform continual improvement of the approach.

With improved Internet access and uptake of mobile technologies, these tools have potential to provide new cost-effective options for real-time information exchange at local, regional, national and even global scales. Such tools may enhance rapid and effective needs-based knowledge sharing, capacity building and online learning opportunities within the agricultural sector; provide increasing opportunity for discussion around risk, decision-making and implementation of sustainable farming practices; and enable agricultural industries to become lead innovators in blended digital and 'in person' extension and outreach. Improved climate risk decision-making and management in agriculture is critical to the well-being and long-term sustainability of farming communities and future global food security.

4:00pm – 4:30pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Using precision livestock management technologies to construct social networks of calving cows

Dr Kym Patison (CQUniversity), Ms Aleisha Finger (CQUniversity), Mr Bret Heath (CQUniversity), Professor Dave L. Swain (CQUniversity)

Perinatal calf loss is a major contributor to poor reproductive efficiency in Northern Australian beef herds. The exact cause of these losses is unknown due to the difficulty in observing parturition in extensive environments. Recent precision livestock management (PLM) technology developments allow researchers to monitor cattle activity remotely, opening up the potential to track expectant mothers and associated calving behaviour. It is known that cattle generally isolate themselves to give birth, but less is known about the subtle association changes that occur prior to parturition. Understanding these changes will increase knowledge on calving behaviour and ultimately perinatal calf loss.

The study used biotelemetry data to construct proximity networks of pregnant and calved cows to investigate changes in social association patterns related to calving. UHF proximity logging devices were used to record continuous association data. An association was defined as two individuals within 4m of each other. The results were compared with visual observations of group memberships. Analysis of the observation data revealed that parturition was a definitive change point in social associations. The current research extends from the observational study to consider continuous data, thereby avoiding the loss of important information via aggregation, whilst also providing validation for the proximity logger data.

The outcomes demonstrate the potential for proximity loggers to: identify behavioural changes associated with physiological status; construct proximity networks from social association data; and analyse contact information both within- and between-groups of interest. Using PLM technologies, such as proximity loggers to derive real-time calving status from association data, is presented as a non-intrusive solution to assist future research into perinatal calf loss in extensive beef herds in northern Australia.

4:00pm – 4:30pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Reconsideration of the role of open access publishing in widening public access to research

Dr Xiang Ren (University of Southern Queensland)

A growing number of universities and funding institutes have adopted open access mandates that require publicly funded research to be publicly accessible. Research impact is defined as “an effect on, change, benefit to the economy, society, culture, public policy or services, health, the environment or quality of life beyond academia”. As such, it is increasingly important for open access communities, as well as other stakeholders, to widen public access to high quality refereed scholarly content in addition to improving the efficacy of scholarly communication within academia.

There is meaningful effort and progress in open access publishing to make scholarly content accessible free of charge in either publishers’ websites or institutional repositories. There are also projects like “Access to Research” in the UK focusing on widening public access to scholarship in public libraries. However, this is not enough to effectively engage the general public with open access scholarship. The open access resources are still poorly discoverable to the public and the established scholarly publishing platforms designed for academic use may be too complicated for general readers to search, read, and reuse open access content. The obstacles resulting from business and policy aspects also exist.

This presentation reviews the research and practices in widening public access to open access scholarship and identifies the issues and challenges in engaging the public with publicly funded research. It then discusses how to bridge the gap between public knowledge demands and open access scholarly resources. The presentation also links

public access to open access scholarship within the context of digital futures, from which further research directions and practical suggestions for stakeholders will be derived.

4:00pm – 4:30pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Here and now: Digital solutions for supporting Indigenous community engagement and representation in national museum spaces from regional and rural communities

Dr Sandy O'Sullivan (Batchelor Institute of Indigenous Tertiary Education), Dr Peter Stephenson (Batchelor Institute of Indigenous Tertiary Education)

How inclusive and relevant are museums and national keeping places to rural and regional communities? Do audiences have to visit Canberra or a state capital to experience the unique cultures of their own area, or can they be delivered in other ways? Importantly, can they be delivered to national spaces from regional and rural areas?

Indigenous communities, in particular, have become the focus for the gathering of experiences, materials and stories within our national and major state-based museums. Does that relocation and removal from place, forget that location matters in the experience of understanding and engaging some of our more remote and regional peoples and communities?

These questions are formed around a broader multi-year ARC-funded research project that focuses on the effectiveness of national spaces in using digital processes to engage and represent Indigenous communities. This is the first of our presentations to focus specifically on what these issues of representation and engagement might mean for regional and rural communities, using both national and international examples. A key focus will be on national interest, available funding of these important cultural spaces, and on the rollout of more effective means of communication across the geographies of these different spaces of culture.

4:30pm – 5:00pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Engagement, empowerment and rural mining communities

Mr Michael Odei Erdiaw-Kwasie (University of Southern Queensland), Associate Professor Khorshed Alam (University of Southern Queensland), Dr Md Shahiduzzaman (University of Southern Queensland)

Past literature has argued the need for an enabling platform for communities to express their concerns through a stakeholder dialogue within the Corporate Social Responsibility (CSR) discourse. Considering the dynamic and computerised nature of our world today, this study considers a new dimension of the argument. It posits that local communities who are

key beneficiaries of CSR do not have what it takes to effectively engage in consultation and dialogue, hence the need for community empowerment as a prerequisite to engagement. The study intends to consider four main elements of empowerment, of which access to information is paramount, to ensure well-informed partners in the collaboration. It is evidenced from companies' reports, most particularly in the mining industry, that details of their Global Reporting Initiatives (GRI) and engagement strategies usually involve access to the company's website. This shows that, for such corporate-community partnership to be effective, localised and development driven, there is the need for such regional communities to be physically and information-wise empowered. Case study approach within a naturalistic and interpretivist paradigm is the research design for this study. The specific case involves the CSR practices of Origin Energy in the Surat Basin region within the context of community engagement. Qualitative data are collected using interviews, focus group discussions and observations of participant communities and the company. The finding for the study is that elements of empowerment, such as access to information, positively influence the five principles of effective engagement, communication, transparency, collaboration, inclusiveness and integrity. The study is significant as it aims to make empirical, policy and theoretical contributions towards current CSR practice discourse within the context of digital communities.

4:30pm – 5:00pm

Parallel Session: Regional Futures

Venue: Toowoomba Council Room, R113

Digital futures and small businesses in regional Queensland: What does a best practice digital innovation look like?

Dr Subas Dhakal (Southern Cross University), Dr Muhammad Mahmood (University of Southern Queensland), Professor Kerry Brown (Curtin University)

Small businesses, i.e. enterprises that employ 5 or more but less than 20 people (ABS, 2002), are considered the driving force behind economic growth and opportunities in regional Australia. There are over 400,000 small businesses in Queensland (QG, 2014), more than half of which operate in regional areas i.e. non-capital cities (RBA, 2012). Small businesses, in general, operate in challenging circumstances with limited access to investment capital and with uncertain availability of essential resources such as human and social capital. These challenges are exacerbated in regional areas due to the tyranny of distance, hyper-competition and globalisation. Innovation is often seen as a key to enhance competitiveness and resilience of small businesses. While innovation is generation of an invention and the conversion of that invention into useful applications (Roberts, 2007), resilience is about adaptability of businesses to changing circumstances by adopting innovative management practices (Hamel & Välikangas, 2003). The potential of Information and Communication Technologies (ICTs) for small regional businesses has been increasingly recognised as a way to support adaptability to innovate and foster resilience. However, given that small businesses are struggling to keep up with the ICTs in Australia (Kimber & Mason, 2013), examples of a best practice of ICT-mediated innovation can explore resilience in small regional enterprises. This paper responds to this gap and

presents a case study of a small tourism enterprise building resilience through ICT-mediated innovation. The study examines and analyses a holiday accommodation provider based in the Gold Coast that operates virtually without any face-to-face contacts with its customers. An online business model means that the enterprise has a competitive advantage over offline competitors because of lower operating costs. Since the broader tourism sector generated \$96 billion in visitor spending in 2011, half of which occurred in regional areas (TRA, 2012), the findings of a case study provides valuable insights into building: a) resilience of small enterprises and ICT-enabled innovation and b) competitive digital capacity of tourism related small businesses in regional Australia.

4:30pm – 5:00pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Decadal climate variability and improving adaptive capacity in agriculture

Associate Professor Joachim Ribbe (University of Southern Queensland), Mr Bernard Stilgoe

Improving the nation's ability to respond to the risks and opportunities associated with climate variability and change relies on understanding impacts from climatic events, building human adaptive capacity, and driving technological progress. Advances in high speed computing, massive data storage capacity, and an extensive national to global scale atmosphere and ocean observing system networked within a modern communications environment underpin the nation's capacity building activities. Rural industries, managers and policy makers have been particularly successful in dealing with inter-annual climate variability due to the El Nino Southern Oscillation. At the same time, the nation is planning strategies and approaches to deal with long-term climatic changes. However, Australia seems to be ill prepared and inexperienced in responding to the impact of decadal scale climatic variations lasting 10-20 years. Developed autonomous or planned adaptation mechanisms to deal with inter-annual variability are likely to fail on the decadal scale, thus ad hoc solutions are relied on to manage the agricultural sector, inform drought policy development and the management of water resources. In this paper, a brief review of current activities to better understand decadal climate variations and the known drivers of decadal rainfall variability is presented. A particular focus is on a recent new analysis of the variability of heat stored in the Pacific Ocean's Warm Water Pool. There is a clear link to varying Australian rainfall on the decadal scale; however, changes in the warm pool size would only add to the impact from other contributing factors of decadal rainfall variability. Better understanding of these patterns may enable a planned response to long-lasting dry periods such as the so-called Australian Millennium Drought during the first decade of 21st century.

4:30pm – 5:00pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

The use of precision livestock management technologies to derive reproductive performance measures in the northern beef industry

Mr Don Menzies (CQUniversity), Dr Kym Patison (CQUniversity), Professor Dave Swain (CQUniversity)

The northern beef industry comprises approximately half the national herd. Breeding is the major focus but reproductive efficiency is low due to large postpartum anoestrus intervals and the delayed onset of puberty.

The issue of suboptimal reproductive rate is well recognised; however, there is negligible demand from commercial producers for animals with high genetic merit for fertility or seed stock producers promoting their reproductive credentials. This contrasts temperate zones where greater percentages of seed stock animals are sold with Estimated Breeding Values (EBVs) for Scrotal Circumference and Days to Calving.

Pedigree, age and fertility data, such as age at onset of puberty, can be used to assess total reproductive rate. The generation of fertility EBVs in extensive production systems has been impeded by a lack of cost-effective recording methods. Precision livestock management (PLM) technologies show promise in generating these critical reproductive parameters. Walk over Weighing (WoW) and Taggle radiolocation ear tags are PLM technologies that have potential for generation of EBVs. WoW systems provide maternal parentage within the sheep industry and although there is anecdotal evidence of its use in the beef industry there has been no scientific validation. Taggle technology has been used to track livestock grazing patterns but there is limited information on its spatial accuracy and no evidence of tracking biological events.

Our research has focused on validation of the Taggle location accuracy and the design of WoW systems. Future research will assess whether: 1) biological interactions including onset of puberty can be inferred based on animal proximity 2) weight loss at parturition can be used to determine calving date and hence birth date 3) and, finally, if maternal parentage can be assigned by interrogating WoW tag lists for the frequency of cow/calf tag combinations. The results of the research will translate into more-easily captured EBVs for reproductive efficiency.

4:30pm – 5:00pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

The changing nature of workplace learning for higher education teachers in the digital future

Ms Maxine Mitchell (University of Southern Queensland)

As learning becomes more mobile, social and informal, the divide between spaces, places and digital devices is merging. The expectation today is that modern university teachers fully utilise the capacity of digital technologies to design engaging, authentic and personalised learning activities to enrich the educational experience. Holding the view that teachers are the single most important learning resource available to most Higher Education students, the purpose of this presentation is to rethink institutional-led professional development to design personalised (and often mobile), collaborative and transformative learning experiences for educators as part of their continuous professional learning. The presentation will take a pragmatic view, curating the emerging discourse to reconceptualise professional development in the workplace, and to surface characteristics shared across mobile learning and professional learning contexts.

To address this, the presentation will take an “as-lived” experience approach, which looks at the ways people experience learning about mobile learning in natural settings. The presentation will use trigger points from the literature to generate interactive, critical and reflective conversations with the audience. This will surface their “as-lived” experiences with how mobile learning and professional learning can work in union (or not) to transform practice.

4:30pm – 5:00pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Digital communities for remote Aboriginal and Torres Strait Islander tertiary students

Mr Philip Townsend (Flinders University)

Aboriginal and Torres Strait Islander tertiary students in remote communities are separated by physical distance from their institution and fellow students. Digital technologies raise new possibilities of connectedness, and enhancement of learning opportunities and outcomes. The author’s current PhD research explores the way Aboriginal and Torres Strait Islander pre-service teachers view the potential use of mobile devices for their studies while living in remote communities. Initial findings show a strong interest amongst many of these student teachers to participate in digital communities.

Individual interviews and focus groups have been conducted with pre-service teachers from two community-based Initial Teacher Education programs in Queensland and South

Australia. Most participants are also Aboriginal and Islander Education Workers employed in schools.

During interviews student teachers indicated mobile devices make study engaging, as they allow course members to connect with one another at times and in locations that suit them. Students gain academic support for their assignments and also benefit from personal emotional encouragement.

This research is important as it raises pedagogic issues pertaining to both affordances of mobile learning and cultural preferences, as well as matters of autonomy and agency in learning. Economic efficiencies for the delivery of programs in such locations seem likely, as students aver that use of mobile devices contributes to enhanced retention and improved rates of timely completion. This study aims to generate new knowledge about reasons for and inhibitors to the uptake of mobile devices in community-based Initial Teacher Education programs for Aboriginal and Torres Strait Islander people in remote communities.

Thursday 26th June

9:00am – 10:00am

Keynote Presentation: Digital Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Learning with mobiles in the rural digital future: Lessons from far away and long ago

Professor John Traxler (University of Wolverhampton)

In the early half of its first decade, the global progress of mobile learning was characterised by small-scale pilots and a smaller number of larger initiatives; typically in a handful of innovative centres, and largely limited to English-speaking regions: some in developed countries and others in developing ones. The mobile learning community overcame the barriers of geography, distance, scarcity, infrastructure and resources to take learning to those that were previously denied access to conventional educational interventions. It demonstrated that it could extend and enhance existing ideas and models of technology-enhanced learning, motivating disengaged and disenfranchised learners. These achievements were not easily won and still left many other challenges to tackle.

Sophisticated mobile technology was scarce, fragile, expensive and difficult, and was the prerogative of institutions. This meant that mobile learning was positioned at the vanguard of e-learning research and necessarily bought into the rhetoric, mechanics and funding of innovation, leading to an ecosystem of projects and ideas about early adopters, opinion-formers and critical mass. It grew out of the aspirations and frustrations of e-learning practitioners and built on the same theoretical frameworks but produced evidence and output that had little to say outside the realms of small-scale, fixed-term subsidised projects run by enthusiasts.

In the second half of this decade, mobile technology became ubiquitous, robust, cheap and easy. For institutions, change, if it happened, was forced from outside and mobile technology became so familiar that policy makers and practitioners could be excused for thinking that learning with mobiles was now common-sense and that research was no longer necessary. Those foundational disciplines should perhaps have included sociology rather than psychology; mobile technologies challenge, disrupt and by-pass formal learning and knowing rather than merely enhancing and reinforcing it.

This presentation will focus these observations onto the specifics of a rural digital future.

10:30am – 11:15am

Invited Speaker: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Regional climate change: Threat or opportunity

Professor Snow Barlow (The University of Melbourne)

Australia's climate has warmed more than 0.90C over the past century. Rainfall has slightly increased since 1900 but changed regionally, increasing in the northwest since 1970, but declining in the southwest. Since 1990 autumn and early winter rainfall in Southeast Australia has mostly been below average.

Clearly Australia's climate is changing and we must plan for further change. In the next 15 years to 2030 we can expect another 0.6-1.50C warming on the basis of existing emissions. Depending on the outcomes of international emissions negotiations we may experience a further 1-20C of warming by 2050. However, despite these global and national changes in climate, successful adaptation to them is by nature regional. Therefore, it is the changes to regional climates, and particularly the changes in the frequency of extreme climate events, that must inform adaptation.

Regional adaptation to climate change must be realistic and comprehensive, not concentrating exclusively on perceived threats but also seeking to identify emerging opportunities. Already we are seeing climate related shifts in the mix of agricultural industries within specific regions such as cotton in Southern NSW, broadacre cropping in Western Victoria, and the expansion of the grape and dairy industries in Tasmania.

Ironically one of the major sources of this global climate change, the industrialisation of Asian nations, particularly China, will also result in emerging opportunities for regional Australia. The unprecedented confluence of global market forces for food and fibre resulting from population growth, the emerging middle classes in these economies, competition for natural resources between food, and fuel and the impacts of climate change on agriculture, are already having an impact on food prices globally. These emerging markets will be very competitive.

The challenge for Australia's agricultural regions will be to adapt quickly enough not only to climate change but also to these emerging market opportunities so that they remain globally competitive and share in the wealth that these opportunities can generate.

11:15am – 11:30am

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

The regionally engaged researcher: A case study in supporting early career humanities researchers through the research cycle

Dr Jacqueline Blake (University of the Sunshine Coast), Professor Mark Toleman (University of Southern Queensland)

Humanities scholars from regional universities often ground their research in the current concerns of the surrounding rural community. They document and investigate solutions to problems in areas that would be of interest to that community. However, communication of that research to the surrounding community can be problematic. University researchers publish in journals that members of the regional community may find difficult to access, for example Toowoomba Regional Library does not offer access to online databases such as ScienceDirect. This equity of access issue establishes a barrier between the community and the university researcher working in the problem domain. The move toward the idea that research data whose collection was funded by public money should remain a public good available to others helps to remove this problem.

There is a culture of self-reliance around research, where researchers are expected to be able to learn the required skills with minimal effort (Lyon 2007). However, humanities scholars have been identified as lagging in incorporating research data management practices into their research projects (Borgman 2009; McKay 2010). In this case study we investigated how early career (beginning postgraduate research) humanities researchers can be supported in their decision making around the management of research data. Rather than starting the discussion around many research data concepts, such as sharing research data, the chosen approach was to discuss matters of immediate concern to the researchers. This discussion started with project management questions that had been identified as barriers.

It is planned that future discussions with this cohort of researchers should follow the path of the researchers' projects. It is postulated that driving change through early career researchers will help push change through to supervisors, while proving a support to early career researchers. The community gains through access to open access regionally focused digital research.

11:15am – 11:30am

Parallel Session: Agricultural Futures

Venue: Toowoomba Regional Council Room, R113

Northern Australia Reproduction Group: A new approach to an age-old profit problem

Dr Don Menzies (CQUniversity), Mr Chris O'Neill (CQUniversity), Dr Brian Burns (The University of Queensland), Mr Nicholas Corbet (The University of Queensland), Mr Paul Williams (Tropical Beef Technology Services), Dr Kym Patison (CQUniversity), Professor Dave Swain (CQUniversity)

Reproductive performance is a major profit driver in northern Australian beef herds. Predictions based on ABARES data show that by 2015 the northern beef industry's productivity (kg beef relative to herd numbers) will have declined to 1996 levels. Poor management, genetics, nutrition and environmental stressors result in low reproductive performance. The Northern Australia Reproduction Group (NARG), a collaboration of central Queensland research and extension bodies, is focused on genetic improvement,

animal behaviour, emerging data collection technologies and extension strategies, to bring a fresh approach to the issue.

Recent research has identified heritable reproductive performance traits in tropically adapted cattle. Reproductive genetic gain relies on R&D pathways to ensure adoption of herd recording programs. The obvious conduit is BREEDPLAN, a genetic evaluation system for beef cattle, which produces Estimated Breeding Values (EBVs) for a range of production traits. Currently there are 25 breeds that have EBVs and 50% of those record weight measurements. However only 25% of males have scrotal circumference EBVs and only 21% of females have joining records submitted to BREEDPLAN. The uptake of EBVs is lower in tropical than temperate breeds.

Collecting reproductive performance parameters by seed stock producers is difficult. Digital technologies are capable of measuring behaviours that are indicative of oestrus activity. Information on oestrus activity can be used for improved fertility selection indices.

The NARG are investigating the use of novel digital technologies to capture parameters such as birth date, maternal parentage, onset of puberty and oestrus resumption. These technologies will provide direction to the northern beef industry to efficiently collect reproduction parameters. The NARG's objectives are to improve data collection activities, increase the understanding of reproductive loss and the role of genetics and behaviour in improving herd reproductive performance and profitability.

11:15am – 11:30am

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Opportunities for UAV use for on-farm surveillance

Dr Cheryl McCarthy (University of Southern Queensland)

UAVs are an emerging technology for agriculture and on-farm surveillance. Potential uses comprise identifying particular field conditions in broad-acre crops and expanses of farming land, which would otherwise go unquantified or undetected due to time and labour constraints of farmers. UAVs can support a diverse range of sensors to rapidly provide field-scale data for subsequent review and analysis.

Potentially, UAVs are part of a robotic farming system with automated on-farm sensing, e.g. UAV-based machine vision sensing that automatically identifies regions of interest in the paddock and alerts the farmer. Particular envisaged applications for UAVs include crop and field surveillance (e.g. for weeds, pests, diseases and nutrient deficiencies) in cotton, grains and sugar industries.

Practical application of UAVs by farmers and consultants is expected to lead to tangible economic, environmental and social benefits via timely and improved awareness of field conditions and more informed management decisions. This paper will give an overview of potential benefits and drawbacks of using UAVs for on-farm surveillance, with consideration to different platforms and training and skill requirements.

11:15am – 11:30am

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Nutrition informatics: Utilising digitised nutrition information to transform dietary intake

Professor Robert Steele (CQUniversity)

Nutritional information is increasingly available in a digital or structured form due to a number of developments: (1) digitised nutrient component databases, either national or commercial initiatives (2) databases of consumer packaged foods indexed by Universal Product Codes (UPCs) or barcodes; (3) survey databanks of food items actually sold or purchased indexed by UPC or other food identifier; (4) increasing use of and more detailed food package nutrition labelling; (5) increasing use of electronic point-of-sale systems; and (6) the rapid emergence of health and diet-related mobile “apps” and mobile device-based food intake information capture tools. While these developments have emerged somewhat independently, there is now the potential to move towards further integration and processing capabilities arising from these developments. Such integration, even where partial, has the potential for significant impact upon the efficiency and sophistication of the food supply chain, and the diet and health of individuals and population-wide health – we refer to the underlying and enabling field of study as Nutrition Informatics.

In this presentation we discuss the technological underpinnings of such integration and the implications for optimised dietary intake. In particular we focus on the possibilities for emerging software tools that utilise food and nutrition information to enable consumers to eat in a healthier way. One of the desirable developments are digital food labels, which are the equivalent of the current physical nutrition fact panels, and can allow the easier inputting of nutritional information per purchased food item. A second development is standardised application programming interfaces (APIs) to nutrition component databanks. Such developments can help catalyse a nutrition informatics ecosystem including third-party software developers, and resulting in a far more sophisticated and health-supporting food industry from producer to consumer.

11:15am – 11:30am

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Sharpening the saw: Building a digital community of scholars

Associate Professor Shirley Reushle (University of Southern Queensland), Ms Penny Bentley, Ms Erika Beljaars-Harris, Ms Maxine Mitchell, Ms Joyce Seitzinger

Supervision of research students is an essential activity for universities and developing candidates as capable researchers is an important focus of supervision. The traditional model of supervision has tended to be based on the relationship between an individual student and their supervisor, sometimes with the addition of a co-supervisor. An academic “apprentice” (the student) has learnt by observing how the “master” conducts research, by

undertaking sustained academic research themselves, and by having other “masters” provide written and verbal feedback. Doctoral supervision need not be limited to face-to-face master-apprentice or co-supervisory models and may instead be implemented through a collaborative supervision model using a blend of digital communities with (possibly) face-to-face contact, thus increasing the reach for potential research students. Collaborative digital supervision uses the capability of the Internet for synchronous and asynchronous interactions, providing opportunities to engage with local, national and international students, peers, “experts” and other colleagues within a collaborative network or assemblage of supervision cells. This presentation describes the collaborative team learning model of supervision being undertaken at a regional university and shares the early experiences of a group of students, their supervisors and other invited colleagues. This approach responds to students’ preference for greater contact with others and addresses the potential limitations of social, geographic and intellectual isolation that can occur during the journey of the research student. It describes a rich tapestry of digital options within which research students are able to meet to discuss common interests, challenges and concerns, experience mutual support, gain access to a broader range of literature and ideas and acquire a wider knowledge and understanding of research design and methods. The approach also provides spaces for participants to re-energise, re-invigorate and reflect within a safe, supportive environment as well as build research partnerships, project management, teamwork and digital literacy skills.

11:15am – 11:30am

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Online STEM education using remote access laboratories through the RALfie project: Remote access labs for fun, innovation and education

Dr Lindy Orwin (University of Southern Queensland), Dr Andrew Maxwell (University of Southern Queensland), Dr Warren Midgley (University of Southern Queensland), Dr Alexander Kist (University of Southern Queensland), Mr Ananda Maiti (University of Southern Queensland), Ms Ting Wu (University of Southern Queensland)

The RALfie Project, funded by the Digital Futures Collaborative Research Network, is using design-based research methods to develop an online environment to deploy real experiments via Remote Access Laboratory (RAL) technology to bring together learners, teachers, experts and enthusiasts in an innovative user-built learning community. This project targets key issues challenging Australian Science, Technology, Engineering and Maths (STEM) education and affecting Australia’s economic future. These challenges include low student engagement and participation rates in STEM in secondary schools; primary school teachers, and some secondary teachers who are teaching outside their content area, with low levels of content knowledge and pedagogical knowledge in relation to STEM; and lack of equal opportunity for students to participate in hands-on experiments.

Regional Futures, Agricultural Futures, Digital Futures

The emerging design incorporates a quest based game format with a reward system of points and badges that provides a context for the content and experiments. The technical research supports the development of a scalable, innovative, peer-to-peer system to support rapid response times and a high quality user experience. A 'Maker Approach' to the development of experiments by participants of all ages complements the user community to make a self-sustaining community. Using game-style guilds will support communication and collaboration between makers and users.

Investigation has identified a growing list of design implications for rural and regional participation in the RALfie Project. The project has potential to be a new channel for more access to peers and mentors for support and learning for rural children and teachers. Awareness of access capabilities at home and at school is influencing the design of experiments and their associated quests as well as the functional aspects of the technical system. This participatory session will outline the RALfie Project and draw on the audience members experience and knowledge to aid the future design decisions of the project.

11:30am – 11:45am

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Helping regional communities build cultural resilience: Examining the role of the Community Futures and Cultural Resilience program

Professor Lorelle Burton (University of Southern Queensland)

Regional Australia, with its diverse landscapes, communities, natural resources and industry, has developed within an environment characterised by change and unpredictability. Compared to their metropolitan counterparts, regional areas rely on cultural and community resilience to sustain themselves through change. Over the past half century the general socio-economic trend across regional Australia has been one of relative decline, most notably in population, community capacity, social equity and economic diversity. Of particular concern to these diverse regional communities is the need to sustain the cohesion of community.

The Community Futures and Cultural Resilience research program will examine how understanding culture (values, language, customs, and norms) enables individuals and communities to be resilient in the face of adversity. Through engaged research activities and with its commitment to social justice and the rights of all people in the community, the Community Futures and Cultural Resilience program will strive to understand how to better strengthen communities and create social equity to enhance quality of life. The multi-disciplinary team works with the whole of community, including marginalised, disadvantaged and other isolated groups, to undertake research to better understand the social situations and cultural contexts associated with disadvantage or opportunity.

This paper examines, through its projects, how this research team will showcase the Institute of Resilient Region's research capacity for identifying workable solutions to foster adaptive capacity, thus helping community to address complex problems and tackle issues of local and national relevance. Projects will specifically focus on marginalised youth and

the aged; work in partnership with indigenous communities; the wellbeing of families separated by occupation; the education of mobile communities; the study of migrant communities and, lastly; community identity, with particular reference to the functioning of public pedagogies.

11:30am – 11:45am

Parallel Session: Agricultural Futures

Venue: Toowoomba Regional Council Room, R113

Intelligent use of technology for 'real training on real farms'

Ms Jane Murray (Taratahi Agricultural Training Centre), Mr Paul Crick (Taratahi Agricultural Training Centre), Ms Miekies Buckley (Taratahi Agricultural Training Centre)

Taratahi Agricultural Training Centre has been training the next generation of farmers for more than 94 years. The success of our programmes can be attributed to our 'real training on real farms' teaching philosophy. Staying true to this underpinning philosophy, i.e. our farms are our classrooms, creates obstacles that you would not find in a normal classroom environment. By using technology intelligently on our farms, Taratahi has enhanced the learner experience and has improved farm efficiency and productivity.

Taratahi's on-farm training is based on practical learning; this involves demonstration, explanation, interactive reflection, and discussion. Taratahi has implemented the use of tablets and smartphones to assist this process. Tablets enable educational resources to be accessed anywhere on the farm; video playback is used to provide interactive and real time learner feedback, and feed budgeting is demonstrated on a whole-farm scale. Improved connectivity between farm tutors and learners has also been enabled through the installation of mobile phone repeaters.

At Taratahi we farm where we teach; however, our farms cannot exist without efficient, productive and profitable farming systems. We have implemented EID technology on our farms to enable individual animal performance recording. The information collected is used to enhance management decisions, and to demonstrate those decisions to learners. The farms also use feed budgeting software, online weather stations, and online farm databases.

Lack of connectivity and standardisation of activities across farms to ensure adoption of best practice methods are obstacles faced as a result of on-farm training. Through the use of technology and enhanced connectivity, farm records, educational outcomes, and learner development can be stored and shared between trainers in different locations. This means a more nimble and learner-centric orientated system that is focused on the individual needs of the learner while enhancing productivity on farm.

11:30am – 11:45am

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Within-vineyard management of wine style: A realistic digital rural future

Dr Rob Bramley (CSIRO), Ms Tracey Siebert (The Australian Wine Research Institute), Dr Markus Herderich (The Australian Wine Research Institute)

Previous work has highlighted the importance of vineyard variability and the benefits that may accrue through targeting management in response to it. However, most zonal vineyard management has relied on understanding of variation in vine vigour and grape yield; understanding of spatial variation in specific attributes of grape and wine quality has been somewhat elusive. Here, we were interested to see whether the content of rotundone in Shiraz (*Vitis vinifera* L.) grapes was spatially structured and related to other aspects of vineyard variability so as to inform the possible selective harvesting of grapes destined for high value wines of ‘peppery’ character.

Immediately prior to harvest (2012 and 2013) of a 6.1 ha block in the Grampians region of Victoria, a region known for producing ‘peppery’ wines, fruit was sampled from 177 ‘target vines’ and analysed for its rotundone content. The resulting data were mapped and overlain with other map layers describing variation in soils, topography and vine vigour.

Berry rotundone concentration was found to be markedly spatially variable and showed remarkably similar patterns of variation across the two years of the study in spite of the 100-fold difference in mean rotundone concentration between the two contrasting years. As with previous analyses of variability in indices of grape quality, spatial analysis strongly suggests that variation in berry rotundone concentration was associated with variation in vineyard soils and topography, with the influence of the latter on ambient temperature implicated as a likely driver of rotundone variation.

To our knowledge, this is the first study of within-vineyard spatial variability in a grape-derived wine flavour compound. It highlights the possibility of using selective harvesting as a means of influencing wine style – in this case, the ‘pepperness’ of Shiraz. Such a commercially significant advance points to an exciting digital rural future for the wine sector.

11:30am – 11:45am

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Estimation of biomass using active optical sensors: A satellite in your pocket!

Dr Mark Trotter (University of New England), Professor David Lamb (University of New England), Dr Robin Dobos (NSW Department of Primary Industries), Dr Andrew Roboson (University of New England)

Active Optical Sensors (AOS) are a relatively new class of sensor. These devices direct a beam of light, usually comprising both red and near infrared wavelengths, onto the plant

canopy and an on-board detector records the returning radiation and calculates the optical reflectance of the target canopy in those specific wavelengths. The key advantage of the technology over passive optical sensors (like radiometers and spectrometers) is that they contain their own light source and readings can be taken under any illumination conditions, including at night.

These devices have been developed for use in the cropping industry, mainly for inferring crop nitrogen levels; however, recent research has demonstrated the potential for applying the same technology to estimate the green fraction of pastures. In addition to collecting static 'point' readings, which is a constraint of plate meters and capacitance probes, AOS do not require physical contact with the canopy so can be operated from a moving vehicle to collect transect averages, or when coupled with a global positioning system, provide pasture maps.

Previous studies suggest an accuracy of RMSE (validation) = 288 kg/ha GDM can be achieved over a range of seasons for fescue swards. New research using a single site progressive cut and scan approach suggests that AOS are even more accurate under constrained conditions with correlation coefficients of greater than 0.99 being achieved for both forage oats and fescue swards. The equivalent prediction accuracy of RMSE (validation) = 132 kg/ha GDM. Further research is required to determine how well these correlations hold up over different sites, soil background reflectance, seasonal and phenological variations.

This work was funded by the CRC for Spatial Information (CRCSI), established and supported under the Australian Government's Cooperative Research Centres Programme.

11:30am – 11:45am

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Digital and connected: Online communities and improved health outcomes for the regions

Associate Professor Jeremy Buultjens (Southern Cross University)

Asbestos-related disease has considerable physical, social, psychological and economic impacts on those diagnosed, their carers and families. Asbestos-related disease limits mobility and often results in feelings of isolation. This is especially true of those who reside in regional areas. Isolation can lead to feelings of exclusion from ordinary living patterns and activities or, in other words, to social disadvantage. The role of support networks in the life of people with an asbestos-related diagnosis, and their carers, appears to be substantial and helps minimise the feelings of isolation and frustration from being unable to lead a normal life. This would suggest that increasing access to support networks would have noteworthy benefits for the diagnosed and their carers. One method that could provide increased access to support networks, thereby overcoming isolation and social disadvantage, is the use of information and communication technology to create and support online, peer-to-peer communities. This type of technology is particularly useful in a country like Australia, which suffers from the 'tyranny of distance' with a number of its

citizens living in remote, rural and isolated locations many kilometres from urban centres. This paper presents details and findings from a pilot project that involved the creation of the Dusted Community, a peer-to-peer online community for men and women affected by an asbestos-related diagnosis. It was hoped that the Dusted Community, by addressing social connectedness directly, would provide substantial benefits both for individuals with an asbestos diagnosis and for their carers. The Dusted Community offered an online community to provide support, friendship, information and a sense of belonging to a wider community of asbestos affected people. The participants expressed strong support for an on-line community and emphasised the unique nature and challenges associated with an asbestos-related disease. This was especially so for women.

11:30am – 11:45am

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Rethinking 'vulnerability': Digital creative content production to enhance the wellbeing of young people living in rural and remote communities

Associate Professor Amanda Third (University of Southern Queensland), Ms Emma Keltie (University of Western Sydney)

Youth mental health represents a significant issue for Australian society today. Suicide is the leading cause of death for young people aged 15-24 (Australian Bureau of Statistics, 2009). Research consistently demonstrates 75% of mental illness emerges before age 25 (Kessler, 2005) and that mental disorders affect one in four young Australians aged 12-25 (Slade, 2009). Living in rural or remote communities has been identified as a factor that influences young people's 'vulnerability' to long-term mental health issues, particularly when overlapping with other indicators of potential social isolation, such as living with chronic illness or disability, being gender variant or sexuality diverse, or entrenched socio-economic disadvantage (Blanchard et al, 2008). Available evidence suggests that, whilst access to effective and timely services is imperative in treating mental health conditions, rural and remote young people's access to such services (including specialist clinicians, and after hours services) is often limited (Aisbett et al, 2007).

At the same time, however, 99% of young Australians engage online on a daily basis (Burns et al, 2013), representing an unprecedented opportunity to reach, engage and connect young people in rural and remote settings to better support their mental health and wellbeing.

Drawing upon a recent literature review undertaken by the Engaging Creativity project being conducted by the Young and Well CRC (youngandwellcrc.org.au), this paper firstly critiques the ways the concept of 'vulnerability' is applied to understanding the mental health and wellbeing challenges experienced by young people living in rural and remote locations. Then, drawing upon data generated in Research Program 2 of the Young and Well CRC, we reflect upon some of the ways we might be able to better reach, engage and connect these young people using digital creative content production strategies to

promote their social connection, resilience, help-seeking practices, and thus enhance their wellbeing.

11:45am – 12:00pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

The hype and the hope: Progressing towards big data insights for regional communities

Dr Helen Thompson (Federation University Australia), Dr Peter Dahlhaus (Federation University Australia), Mr Andrew Macleod (Federation University Australia)

In this age of 'big data' virtually every field of research and practice is being redefined. Governments are adopting open data policies with the aim of delivering efficiency benefits, increasing evidence-based planning, and enhancing productivity and innovation. Inescapable discussions around big data and analytics are partly in response to an increased availability of next generation broadband and mobile technologies that have created a society that is spatially enabled and aware. Big business and citizens increasingly expect to be able to access past and current information about any location to find answers to their spatial queries. Opportunities are emerging for regional communities to take initiative and eradicate information silos that may have hindered regional collaboration and innovation. In parallel with assisting regions to embrace big data and foster data sharing, a range of research questions arise:

1. What are the best methods to provide access to big and complex data, to assist decision makers?
2. How can digital technologies be used to enhance, rather than repeat, past research?
3. Can qualitative data be used to improve the accuracy of quantitative data or metadata?
4. How can we harness Citizen Science and include crowd-sourced data, while minimising subjective bias and maintaining accuracy?

Interoperable spatial knowledge systems with dynamic modelling and visualisation capabilities have been developed in response to these research challenges. Examples are provided of systems developed in a variety of fields including groundwater research, catchment management, and strategic planning for bushfire.

11:45am – 12:00pm

Parallel Session: Agricultural Futures

Venue: Toowoomba Regional Council Room, R113

Intelligent technology which creates innovative education in agriculture

Mr Charles Impey (Rural Skills Australia)

Regional Futures, Agricultural Futures, Digital Futures

Agricultural Futures - National and global agricultural challenges focus on increasing productivity, sustainable use of resources and embracing digital technologies to optimise Australia's farming future.

Rural Skills Australia have developed intelligent web-based learning management systems providing data and information as a smart service to all people who operate in agriculture. The system supports knowledge progression and information distribution, with the capacity to cater for the entire agricultural supply chain.

Digital Futures - Australia's social, cultural, educational and economic future depends on the capacity to design and utilise emerging digital technologies and embrace their opportunities.

Rural Skills Australia have developed the system with rural and regional areas the focus; however, the system attracts interest from global trade organisations. The systems cater for the most advanced and smart technologies such as smart phones and note pads to the PC Computer located in living room on an isolated farm property with limited band strength, thus addressing, where possible, the connectivity issues in regional areas of Australia.

Rural Skills Australia systems are innovative, with teacher and learner features unique only to the systems developed for agriculture. It allows seamless blended learning across Australia and potentially the globe yet has the functionality to be personalised to cater for the individual trainer, learner or organisation. Due to the unique positioning of Rural Skills Australia as an independent and autonomous entity, intellectual property remains the property of the knowledge provider; we simply provide the system that allows information and knowledge transfer between the source and their 'knowledge market'.

'Rural Skills Online Systems, blending technology with agriculture, taking agriculture to where it needs to beconnected'

11:45am – 12:00pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Contribution of precision agriculture on assessing the spatial variability of yield and quality in a commercial wheat field

Dr Francelino Rodrigues (CIMMYT), Dr Ivan Ortiz-Monasterio (CIMMYT), Dr Pablo J. Zarco-Tejada (IAS-CSIC), Dr Bruno Gerard (CIMMYT)

The agricultural research sector is working to develop new technologies and management knowledge to sustainably increase food productivity, to ensure global food security and decrease poverty. Wheat is one of the most important crops in this scenario, being between the two most important cereal commodities produced worldwide. Precision Agriculture (PA) and Remote Sensing (RS) technologies can contribute to increase wheat yield and quality sustainably. For this reason, CIMMYT's research agenda aims at developing new crop management practices using PA technologies. As part of these

efforts, an experiment has been established on a wheat farm's field in the Yaqui Valley, in north-western Mexico, sowed on January 2014. Our hypothesis is that it is possible to assess the key factors affecting wheat yield and quality variability, aiming to detect the correctable and uncorrectable main factors. We are also exploring the potential for wheat growers and processors to adopt a selective harvesting strategy based on grain protein content, extracting greater value from the raw product. Prior to sowing we carried out a high resolution soil survey using an electromagnetic induction sensor – EM38, mounted in a wood sled and tractor dragged through the field; followed by a targeted soil sampling at two depths (0-0.3 and 0.3-0.6 m) for physical and chemical soil properties analysis. A weekly flight campaign took place from GS31 stage until harvest, using high-resolution airborne hyperspectral and thermal imaging sensors flying at 600 m above ground, with ground resolution of 0.5 m (hyperspectral) and 0.75 m (thermal). Yield and quality monitoring will take place during harvest. We expect to assess the spatial variability of yield and quality using the proximal and remote high-resolution data, exploring the possibility of a logistic strategy for selective harvesting, exploring also the use of those data for a better crop management.

11:45am – 12:00pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Geospatial pattern recognition on the SMART FARM

Dr Greg Falzon (University of New England), Mr Derek Schneider (University of New England), Professor David Lamb (University of New England)

Sensor networks offer unprecedented opportunities to monitor key crop and pasture productivity drivers, such as soil moisture and temperature, and agriculture is becoming a key focus worldwide in development around the 'Internet of Things'. A major challenge when integrating such networks into agricultural enterprises is that of transforming the wealth of data amassed into actionable information for farm management. For instance the 100-node, SMART FARM sensor network located on the University of New England's Kirby property collects at minimum 210,240,000 records per year on air temperature, soil moisture, soil temperature and soil apparent electrical conductivity. Recognising patterns in a data set of such magnitude is clearly a formidable task for a human observer, particularly as years of sensor network data are collected. Automated pattern analysis using a computer offers a solution. By combining geospatial modelling with machine learning algorithms it is possible to use software to automatically analyse the sensor network data across different locations and times. Patterns can be detected and associated with previous patterns known to be of agricultural significance. One application of this technology could be to recognise patterns in the sensor network data that forecast conditions amenable to high pasture productivity; another could be to detect soil moisture depletion as a precursor to the onset of drought conditions. This presentation will explore the recent developments made by the Precision Agriculture Research Group in progressing these algorithms.

11:45am – 12pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Reconnecting and transforming rural and regional futures: Comparing Australian farmers' and teachers' engagement in digital communities

Professor Patrick Danaher (University of Southern Queensland), Associate Professor Craig Baillie, Dr Sayan Chakrabarty, Dr Nick Kelly, Dr M. S. Arifeen Khan Mamun, Associate Professor Jacquie McDonald, Dr John Bennett, Associate Professor Shirley Reushle, Dr Ann Starasts, Associate Professor Marc Clara, Dr Ben Kehrwald

Regional futures remain a complex and contested concept in Australia and internationally. What constitutes regional resilience for some groups might mean little or nothing to other groups, who have different conditions and contexts to contend with. This disparity highlights the value of comparative studies of collective aspirations and outcomes within and across diverse regional communities to maximise the breadth and depth of regional futures studies.

This paper contributes to those comparative studies by drawing on selected qualitative and quantitative data from an ongoing investigation of the uses of digital technologies by two distinct Australian regional communities: farmers and teachers. Despite the significant differences between these two groups, they exhibit noteworthy similarities in the ways that they enact these technologies to enhance informal networks, to build social capital, to share and disseminate knowledge, and to demonstrate sustainable and occupationally specific learning outcomes.

Yet the differences between the groups are also important to analyse. Farming and teaching are highly divergent occupations in terms of their historical development, their cultural mediation and their political positioning. Consequently, farmers and teachers engage in learning, and deploy digital technologies, in very different ways. At the same time, each has much to teach the other regional community about specific and successful strategies for aligning available technologies with relevant and timely learning practices.

More broadly, the paper distils some significant comparative lessons for reconnecting and reimagining regional futures, not only in the respective Australian farming and teaching communities, but also for national and international debates. These debates include policies related to regional growth, technological development, and the survival and sustainability of rural residents. Such 'grand debates' and 'big ideas' lie at the centre and the heart of relevant and rigorous regional futures.

11:45am – 12:00pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Augmented reality: A tool for the promotion and development of rural Australia

Dr Matthew Tucharke (University of Southern Queensland), Mr Steven Rees (University of Southern Queensland), Mr Bo Zhao (University of Southern Queensland), Dr Alison McCarthy (University of Southern Queensland), Dr Cheryl McCarthy (University of Southern Queensland)

Cloud services have enabled large repositories of data to be cumulated over time, which may be queried and retrieved in real-time at the user's request. However, identifying datasets related to a specific location, object or time can be labour-intensive, time-consuming and difficult to visualise. Augmented reality (AR) merges virtual information with a real-world environment and enables relevant data to be easily compiled and visualised based on the user's surroundings or gestures. Mobile devices provide a platform for visualising the retrieved information based on the device's sensing elements (location, orientation, movement, camera and microphone) in real-time. The retrieved information can be integrated as a virtual layer on the camera display of the mobile device in real-time to provide the user with an enhanced awareness and understanding of features within their surroundings.

There are opportunities for AR to be used as a tool across industry sectors including tourism, education, environment, health and social services, mining and agriculture. This presentation will provide an overview of the current and envisaged future development of AR applications that may be used to enhance the connectedness of Regional and Rural Australia. Examples will be given of how AR can provide an efficient medium for education, training and services to regional and rural communities and help increase the productivity of the industries that support them.

12:00pm – 12:15pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

The role of the Innovation Centre Sunshine Coast in developing innovation and entrepreneurship in its region

Professor Mike Hefferan (University of Southern Queensland), Mr Mark Paddenburg (Innovation Centre Sunshine Coast), Dr Pam Wardner (University of the Sunshine Coast)

The Innovation Centre Sunshine Coast (ICSC) was established in 2002 as an initiative of the University of the Sunshine Coast, supported at that time by the State Government and the then local authority.

It now stands as the only such facility remaining that was established under Queensland's 'Smart State' initiative. The model employed has, by any standards, proven successful,

having accommodated more than 110 tenant companies, about 90% of which remain in business today – a remarkable statistic given the typical failure rate of start-up companies.

The Centre is a fully controlled entity of the University of the Sunshine Coast and its success has relied on balancing the demands of that single shareholder with those of tenant companies and the wider community.

This paper provides a summary of contemporary literature relating to the role of regional universities and their support for of entrepreneurship and knowledge based start-up firms. It summarises the evolution of the ICSC as one vehicle that has proven successful in addressing the interface between a regional university and high growth firms within a knowledge-based economy. It also includes primary research into the opinions and priorities of those incumbent firms.

The paper recognises that any such initiative needs to be individually developed having regard to that particular region, its university and the underlying acumen and drive of those emerging firms. Nevertheless, the paper would deduce, based on both literature and the experience of the ICSC, that there are some fundamental principles and guidelines that can maximise the chances of success for comparable ventures elsewhere.

12:00pm – 12:15pm

Parallel Session: Digital Futures

Venue: Toowoomba Regional Council Room, R113

Benchmarking for future growth, a must for institutions with a strong regional focus: You are not alone

Associate Professor Michael Sankey (University of Southern Queensland), Ms Helen Carter (Macquarie University)

To understand where we need to go, we first need to understand where we currently stand. This helps us to establish a solid foundation on which to build. One tool that has helped many institutions do just this is the regular use of benchmarking, more partially the ACODE Benchmarking framework.

In early 2014 the ACODE Benchmarks underwent a major refresh to increase their capacity to help institutions plan for growth and be more future oriented. This resulted in a major International Benchmarking Summit in Sydney in June. Many of the institutions involved in this activity enjoy strong ties with rural and remote communities, both in Australia and overseas. Dealing with this specific demographic requires institutions to ensure their processes and systems are regularly reviewed, to remain agile and act responsibly toward this unique client base, which is somewhat different to metropolitan institutions.

The refresh of the Benchmarks saw the introduction of a much stronger alignment with; L&T standards; a greater emphasis on emerging technologies and innovation, particularly in planning and budgeting; a new measure around open education practices and the sustainable use of resources, and; a measure on how institutions are assuring a level of quality in their externally hosted services. Each institution first self-assessed where they

were placed in relation to these indicators and provided evidence to that effect, then shared this with the other institutions involved.

Importantly, this paper will provide a clear indication of the common issues faced by institutions with a strong regional focus. It will demonstrate that many of these issues can be remediated by simply taking the time to self-assess and share current practice with those in similar circumstances. As those in regional areas can attest, it is by building relationships and stronger ties (rather than by competition) that provide institutions with the wherewithal to meet the unique challenges of building a strong digital future.

12:00pm – 12:15pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

The use of in situ thermal mapping to determine crop stress at field scales

Dr Andries Potgieter (University of Queensland), Mr James Mclean, Mr Greg Mclean, Mr Brendan Power, Mr Peter Davis, Mr Al Doherty, Mr Terry Byrne, Dr Glenn Campbell, Mr Marcos Berardocco, Mr Mitch Byrne

Downward risk in crop production has been part of the Australian environment since cropping began with the arrival of European settlers. Climate and specifically rainfall is the main contributing factor causing such reduction (and variability) in crop production at national, state and field scales. This study set out to research the ability of thermal imaging on various remote sensing platforms to determine crop yield variability at the point and field scale. Here, temperature was measured at a point scale using an Infrared Temperature Sensor (APOGEE), handheld thermal camera and a mobile thermal camera on-board an Unmanned Aerial Vehicle (UAV). Data from these platforms were used to calculate crop stress index (CSI) at point scale from two in-field weather stations and CSI utilising the temperature as derived from the handheld and UAV approaches. Preliminary results from this study showed that CSI calculated from these two latter approaches (using thermography) showed high efficacy in capturing crop stress at point and field scales. Further research is however needed to automate and improve the capturing of thermal imagery from UAV platforms. This approach could be extrapolated and applied via remote sensing platforms to a farm and at a national level to assist producers to hedge against downside on farm risk during a cropping season. Results from such thermal sensing approaches are likely to enhance the ability of producers to hedge their financial on-farm crop production losses due to water stress. This is likely to further augment the adaptive capability of rural cropping industries and thus strengthen its long-term viability both domestically and internationally.

12pm – 12:15pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Crowdsourcing biomass estimation in pastures

Mr Paul Goodhue (University of Canterbury, New Zealand), Dr Femke Reitsma (University of Canterbury, New Zealand), Dr Mark Trotter (University of New England)

An important part of the livestock industry is to optimise pasture utilisation through improved feed allocations based on biomass measurements. This project aims to create a relatively low-cost, quick implementation process, and the tools required to carry out this process, for calculating pasture biomass for Australia's livestock industry. The tools used for the process of estimating pasture biomass are active optical sensors (AOS) and a mobile device application (MDA). Integrating the normalised difference vegetation index (NDVI) and pasture biomass results measured by farmers into a comprehensive data set that supports feed allocation, requires ensuring that these measurements are of high quality. Crowd sourcing NDVI and biomass measurements allows farmers to not only use their own calibrations for biomass estimation, but to also create calibrations for others to use, and make use of high quality calibrations from other users. However, the first step to ensuring such crowd sourced data is useful requires it be tested for quality to ensure it is trustworthy. This research presents a methodology for using crowd-sourced data for calibrating biomass estimations, integrating regional, pasture species and site-specific factors and farmer characteristics to ensure the accuracy of the self-calibration process. This research is part of the 'Biomass Business II - Tools for Real Time Biomass Estimation in Pastures' project, which will target Australia's livestock industry, a sector largely untouched by 'spatially enabled agriculture'.

This work was funded by the CRC for Spatial Information (CRCSI), established and supported under the Australian Government's Cooperative Research Centres Programme.

12:00pm – 12:15pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Engineering an education research field for sustainable rural futures: Research priorities and outcomes for enhancing agricultural, digital and regional futures

Professor Thiru Aravinthan (University of Southern Queensland), Professor Patrick Danaher (University of Southern Queensland)

Engineering education is crucial to developing and graduating successful engineers whose work spans the sustainability of agricultural, digital and regional communities and hence contributes directly to the futures of those communities. Consequently, it is vital that the field of engineering education research is as current and comprehensive as possible, in order to maximise the quality of engineering teaching and learning programs.

This paper deploys a recent evaluative framework for analysing the engineering education research field (Borrego & Bernhard, 2011) to interrogate selected elements of that field as they pertain to Australian undergraduate and postgraduate engineering education. In particular, the paper explores current themes in the literature related to curriculum, teaching and assessment practices; the acquisition of professional skills and graduate attributes; and issues of graduate employability and continuing professional development. This account highlights the engineering education research field as diverse, multifaceted, increasingly politicised and subject to the interplay of competing interests and multiple demands.

More widely, the authors argue that the themes elicited from the contemporary engineering education research field reflect significant research priorities and outcomes that are central to enhancing Australian and international agricultural, digital and regional communities. This is because successful graduates from engineering programs are integrally involved in envisaging, devising, testing and evaluating the technologies that underpin these varied domains of human activity. The sustainable and potentially transformative futures of these communities depend in large part on the effectiveness of the engineering programs and the research that informs them.

12:00pm – 12:15pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

PPP Bill: The antibiotic for all rural Australia's ills!

Mr Rob Moore (R & L Moore Pastoral)

Australian Primary Producers, being "price takers", suffer from a chronic lack of market intelligence, vital to make informed commercial decisions. Think about fuelling up your car if no fuel prices were displayed outside service stations!

The supply "Chains" and "Alliances" are not transparent and it follows that when products and produce "On Consignment" and "Private treaty" consist of the majority of commerce in a particular industry then the true market is not known to competitive forces such as supply and demand dictates. A flat lining and sharing of supply becomes the norm.

A Trade Practise Bill must be legislated by parliament, specific to Primary Production, aimed at the "Farmgate" to secondary Industry phase only. The Primary Production Pricing Bill (PPP) has been submitted to the Australian Department of Agriculture (AUDA) on November 13th 2013. It is based on an American Meat Act bought in to ensure "Equal Access" for all primary producers to supply product for a "Transparent" set of pricing specifications.

All forward offers from secondary Processors would be mandatorily listed on the AUDA-Single Desk Listing Site. There would be NO further Government intervention, other than providing the Facility for all offers to come through. Total freedom and choice will be maintained by buyers and sellers in a secure (logged in); think eBay, ASX.

Appeal: To Industry Bodies, Processors and Politicians for this unprecedented simple and fair Bill.

- Combined Agribusiness Debt is \$70 Billion and rising rapidly;
- Our production @ secondary stage is bringing record returns globally think red meat, grains, dairy;
- Profitability in Primary Industries at farmgate is near terminal, with 1980 prices on offer and 2014 record costs to contend with; and
- Foreign Ownership of almost all of our processing will be tolerable; i.e. the price will discover the produce, not the prod; blindly discovering what is a secretive uncompetitive price.

12:15pm – 1:00pm

Invited Speaker: Agricultural Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Autonomous site-specific irrigation control: The current state and a vision of a future system

Dr Alison McCarthy (University of Southern Queensland), Professor Rod Smith (University of Southern Queensland), Dr Malcolm Gillies (University of Southern Queensland)

Irrigation decision-making systems can automatically determine irrigation timing and volume requirements. NCEA has developed control strategies and sensors to automate irrigation management, reduce labour, and improve water productivity and profit. NCEA's control frameworks 'VARIwise' and 'AutoFurrow' incorporate one or a combination of the following: infield sensing of irrigation application, soil-water status and plant growth and fruit load; hydraulic models for irrigation application; crop production models for predicting crop performance under different irrigation scenarios; optimisation procedure for processing data and determining appropriate irrigation control signals; and actuation hardware for application control.

An integrated, real-time, site-specific irrigation control system has been evaluated on a surface irrigation and centre pivot irrigation system on a cotton crop in Jondaryan, QLD in 2011/12 and 2012/13. The control system determined site-specific irrigation application with data from a weather station, soil-water sensors and camera-based crop monitoring sensing systems for vegetation and cotton fruit load. Field trials demonstrated yield improvements of 10-11% and water savings of 5-12 %.

Current field trials are identifying the data input and measurement and actuation spatial resolution requirements for the control strategies; developing and evaluating control strategies that optimise both irrigation and fertigation application to maximise yield; and investigating control strategies based on artificial intelligence. This presentation will provide an overview of the NCEA's current irrigation control research and the envisaged irrigation automation system of the future.

1:30pm – 2:00pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Digital technologies, interaction patterns and educational outcomes of 'drive in drive out' and 'fly in fly out' families: Lessons for digital rural futures from a single Australian region

Professor Patrick Danaher (University of Southern Queensland), Associate Professor Romina Jamieson-Proctor (University of Southern Queensland), Ms Sharon Louth (University of Southern Queensland), Mr Trevor Black (University of Southern Queensland), Mr David Martin (University of Southern Queensland), Dr John McMaster (University of Southern Queensland), Professor Peter Albion (University of Southern Queensland)

One community where the associations between digital technologies and occupationally mobile families' interaction patterns are not well understood is the "drive in drive out" (DIDO) and "fly in fly out" (FIFO) workers, who often spend extended time away from their families, who remain at home. This paper reports on an analysis of preliminary data from a continuing, mixed methods, exploratory case study of the educational and social experiences of DIDO and FIFO families in a single region in Queensland, Australia. The data reported in this paper have been gleaned from initial focus group sessions conducted in early 2014 with students, parents and teachers from one non-government P-12 school, informed by content and thematic analysis of the three groups of participants' responses.

The analysis reveals an association between the kinds of digital technologies to which family members have access on the one hand and the types of interaction patterns that they engage in on the other. Those interactions vary in terms of frequency, duration, sustainability and utility, reflecting broader constraints and possibilities in the ways in which families strive to maintain and where possible to enrich their relationships. The pattern of use also demonstrates a diversity of educational outcomes for the families.

These findings identify important areas for further study in order to understand and predict regional futures and digital rural futures in Australia and internationally where the DIDO/FIFO lifestyle is becoming an accepted employment option for families. In particular, the discernible links among forms of digital technologies, interaction patterns and educational outcomes experienced by DIDO and FIFO families highlight the inadequacy of decontextualized generalisations and the value of contextually specific studies such as this one. They also accentuate the complex character of digital technologies and their growing influence in shaping – but not determining regional and rural futures.

1:30pm – 2:00pm

Parallel Session: Regional Futures

Venue: Toowoomba Regional Council Room, R113

Towards a unified approach to attracting and retaining teachers in remote parts of Australia

Dr Nick Kelly (University of Southern Queensland), Dr Roderick Fogarty (University of Southern Queensland)

Remote parts of Australia have significant problems with teacher attraction and retention. Over 23% of high school principals and almost 15% of primary principals stated that they had “major difficulty” in attracting and retaining suitable teachers, with over 66% having moderate or major difficulty in high schools (McKenzie, Rowley, Weldon, & Murphy, 2011). Despite the importance of the problem and the quantity of research in the area, policy remains largely unchanged largely due to the complexity of the problem (Plunkett & Dyson, 2011). In this paper we draw upon our own and other recent studies in this area (Buchanan et al., 2013; Ewing & Manuel, 2005) to present recommendations towards an approach to remote teacher preparation that is national and begins at the pre-service teacher level. A comparable study in rural doctors suggests that remuneration is just one of a number of potential factors (Buykx, Humphreys, Wakerman, & Pashen, 2010).

Kollmus and Agyeman’s (2002) model for behavioural change is used to structure discussion around attracting teachers to remote areas. The model considers the interaction of internal factors (knowledge, feelings, values and attitudes) and external factors (infrastructure, political, social, cultural and economic).

The contribution of the paper is a series of recommendations that: (i) teacher preparation (pre-service) nationally addresses the internal incentives of teachers; (ii) ongoing support for teachers in their initial years of service continues to address these internal incentives; and (iii) that external factors be implemented that reinforce these internal incentives. The recommendations are based on a survey of teachers regarding their support needs, prior studies, existing policy documents and literature on successful rural teacher preparation programs (Beltman, Mansfield, & Price, 2011; Beutel, Adie, & Hudson, 2011; Hudson & Hudson, 2008; Mansfield, Beltman, Price, & McConney, 2012; White & Kline, 2012).

1:30pm – 2:00pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Factors influencing the successful adoption of spatial technologies into agricultural industries

Mr Robert Crossley (Agtrix)

The Australian sugar industry have used Geographic Information Systems as part of their business since 1992, and almost all of the 23 sugar mills have mapped their crop annually

for at least the last 14 years. The data is captured and maintained annually, and forms the basis of their crop estimate, mill operation planning, and transport logistics.

Many farmers in different industries comfortably use spatial technologies ranging from simple mapping such as google maps to precision agriculture including controlled traffic and variable rate fertiliser applications, probably more than sugar cane growers. However, there are few examples at an industry level where GIS has been successfully integrated into its core business, and some spectacular examples of industries which have tried and failed.

Agtrix have worked with the majority of the sugar industry over the last 18 years, and has been instrumental in their adoption of these technologies, and recently introduced GIS into the apple, rice and banana industries. In all cases, Agtrix has worked with the industries to identify the business drivers that will define the needs for spatial data and help the industry introduce the appropriate technologies to meet these needs and to justify the effort of capturing the base data.

This presentation will reflect on the factors that contribute to whether projects introducing spatial technologies to an industry result in making it an integral part of an industry's operation, or just an expensive experiment. The factors discussed include the business objectives behind wanting to introduce these technologies, the technologies used and the skill level required to operate them, and the engagement of growers.

1:30pm – 2:00pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Growing wireless: Building digital connections across vast and diverse farm enterprises

Ms JoAnn Resing (Department of Agriculture, Fisheries and Forestry, Queensland)

Primary producers are dipping their toes in the pond of wireless networks. They may start simply, lighting up the homestead to better distribute their Internet signal; or, they can go complex: building a network of wireless antennae across the property, lighting up a multitude of areas and linking these with communication corridors. Producers are keen, their current approach is cautious, but the word is out; there are benefits to a wireless network:

- Attracting and retaining staff. Staff consider 'staying connected' to be as fundamental as food, water and shelter. A network extends broadband to staff housing and remote work camps;
- Improving field communications and safety: harness staff smartphones as walkie-talkies, using mesh network apps to allow within-network calling, text and data exchange; and
- Better control and monitoring of assets: wirelessly control and monitor remote equipment/resources: irrigation, security, watering points and animal welfare.

This is new territory for producers; not only is the language unfamiliar but, many of the digital tools are outside their comfort zone. Our project will demystify the world of networks by creating a simplified network design 'kit'.

Working in partnership with local producers and IT professionals, we are creating a kit that includes: a factsheet, instructional video, an interactive design worksheet and a sample network design with equipment list. It includes everything required to commence design discussions with IT professionals, to seek quotes for the supply of an economical, robust and reliable rural wireless network.

Previously cost, quality of equipment and lack of knowledge were the major barriers to the adoption of wireless networks. Those barriers are tumbling down and it is now the sourcing of appropriate equipment, suppliers and ongoing support that is the challenge.

Incorporation of wireless networks into agribusiness best practice is the future of agriculture and will help build a more innovative, resilient, and profitable agriculture sector.

1:30pm – 2:00pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Improving the patient experience of Aboriginal and Torres Strait Islander patients through the use of emerging technologies and contribute towards 'Closing the Gap' in health status and life expectancy between Aboriginal and Torres Strait Islander people and the non-Indigenous population

Ms Elizabeth Torres-Russell (Metro North Hospital and Health Service)

As the demand for improved healthcare and efficient and effective services continues, the need for 'just-in-time', 'on-demand' and 'up-to-date' culturally appropriate information and resources is increasing. This is essential to support clinicians and staff as well as develop the health literacy of our communities.

Metro North Hospital and Health Service (MNHHS) provides health services not only to Aboriginal and Torres Strait Islander people in its urban jurisdiction but also to Indigenous people from rural and remote areas. Seventy percent of medevacs to the Royal Brisbane and Women's Hospital in 2011 were from rural and remote communities (Cape York and Torres Strait).

This paper explores the emerging technology strategies that MNHHS is currently developing, implementing and researching to deliver patient centred care in a culturally appropriate and culturally safe manner.

These strategies include:

- Developing the Aboriginal and Torres Strait Islander cultural capability of the health workforce through eLearning programs;

- Empowering clinicians with culturally appropriate mobile tools that provide ‘just-in-time’ information and resources they can utilise with Indigenous patients to communicate, inform and educate them on procedures and tests, to gain adequate informed consent and provide links to medical services and support groups when they return to their rural or remote community; and
- Researching how to develop the health literacy of rural and remote communities through the use of emerging technologies, social media and key partnerships.

The research findings will hopefully assist other health service providers in adopting emerging technologies to bridge cultural and language barriers between Aboriginal and Torres Strait Islander patients and health services to improve Indigenous health outcomes.

1:30pm – 2:00pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Digital divide research and methodological challenges in survey design

Associate Professor Khorshed Alam (University of Southern Queensland)

The overall objective of this research is to investigate whether or not a digital divide exists among households, and to determine which factors correlate, in some statistically significant sense, with their adoption of the Internet in rural and regional Australia. Using the Western Downs Region (WDR) in Queensland as a case study, this paper describes the methodological design issues and challenges of framing and implementing a survey instrument in a rural and remote context. A multistage stratified probability sampling technique is employed for the selection of 400 sample households for a combination of face-to-face and telephone surveys (particularly for remote locations). In the first stage, two districts (i.e. Dalby and Miles-Wandoan) of four in the WDR are purposively selected for their remoteness. In the second stage, five towns within each of these two districts are selected; the major town in the district purposively and the other four outside the major town randomly. In the third stage, households are selected using a disproportionate stratified sampling to minimise an oversampling of major towns. Finally, the next birthday method is used to select a participant within each household for sampling responses. Estimation of population parameters, and within-strata inferences and across-strata comparisons in terms of Internet access, usage, impact and preferences are captured using multivariate analyses. Challenges of designing and implementing a cross-sectional study for rural and regional communities include designing probability sampling for a diverse as well as dispersed population, ensuring the randomness of samples and administering the study in a rapidly transforming digital age with varying degrees of Internet usage.

Acknowledgements: The research leading to this paper is funded by the Western Downs Regional Council.

2:00pm – 2:30pm

Parallel Session: Regional Futures

Venue: RUN Room, Allison Dickson Lecture Theatre, H102

Online solutions helping children and adolescents manage anxiety

Dr Sonja March (University of Southern Queensland), Professor Susan Spence (Griffith University), Dr Caroline Donovan (Griffith University), Professor Justin Kenardy (University of Queensland)

Anxiety disorders are one of the most common psychological problems experienced by Australian children and adolescents and can have significant adverse effects in terms of the young person's social and emotional wellbeing. Although there are effective treatments available, these typically require access to specialised professionals and, unfortunately, often involve long waiting lists. This is particularly problematic for young people living in regional areas that are not well serviced by such professionals. Indeed, overall, only 25% of young people with anxiety will receive assistance. Anxiety disorders are closely linked with depression in childhood and adolescence and the short- and long-term consequences cannot be underestimated for regional youth who are unlikely to receive assistance. Digital and online approaches for delivering evidence-based psychological interventions have received much attention in the past ten years. We now know that young people can significantly reduce their anxiety by participating in online programs that they can complete in their own home. BRAVE-ONLINE is an Internet-based CBT program for the treatment of anxiety disorders in children and adolescents aged between 7 and 18 years, which has 12 years of research supporting its efficacy. This presentation will describe the BRAVE-ONLINE program, and its evidence, and will then highlight our current efforts to partner with a national organisation, beyondblue, to disseminate the program to neglected youth in regional and remote areas. Efforts targeted at regional areas are essential to enhance the capacity of young people living in these communities to manage their anxiety, and to consequently build resilience within young people and regional communities.

2:00pm – 2:30pm

Parallel Session: Regional Futures

Venue: Toowoomba Regional Council Room, R113

Calculating better ways to support mathematics learning in rural and regional Australian classrooms

Ms Janine McIntosh (Australian Mathematical Sciences Institute)

The Australian Mathematical Sciences Institute (AMSI) has as its mission the radical improvement of mathematical sciences capacity and capability in the Australian community. In schools, this means the promotion and support of high quality mathematics education for all young Australians. This includes spending several weeks each year working in rural and regional schools:

- Assisting teachers with planning and lesson development;
- Modelling and team teaching lessons;

- Delivering professional development programs; and
- Sharing resources and materials.

The schools division of AMSI is continually sourcing and developing teaching and learning materials to cater for the needs of teachers and students. These materials are then provided free online through the calculate.org.au website. This website also provides teachers from around the country with:

- Short, twenty minute, weekly professional development opportunities;
- An online collaboration and sharing forum and
- Careers resources for sharing with students.

This session will showcase the work of AMSI over the last twelve years up to, and including, that being done currently in the Oakey, Dalby and Warialda regions of Queensland and New South Wales.

2:00pm – 2:30pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Using learning theory to understand the extent that a small and medium beef cattle producer utilises digital technologies in their enterprise

Dr Christopher Noble (University of Southern Queensland)

This research investigates the use of digital information, primarily through computers and the Internet, by small and medium beef cattle producers to see how access, acquisition, interaction, generation and use of information takes place within their enterprises. With the increasing potential to acquire information through digital instrumentation within the enterprise, and through communication with others external to the enterprise, the benefit for a producer from using these information channels is similarly increasing. However, many producers have only partially implemented digital technologies into their production practices. This research uses learning theory to point to the means of growing the capabilities of a producer to implement digital technology as part of a production system and to explain why, in many cases, implementation of digital technologies has resulted only in their being used as communication or storage devices, rather than as tools for analysis of production.

Data has been collected from semi-structured focus groups and in-depth interviews from fifty participants, comprising of small and medium beef cattle producers and their nominated information sources from the New England Area of New South Wales. Age and gender characteristics influence the likelihood that a producer implements a digital technology but it is found that, under conditions of social collaboration between a producer and another, uptake of digital technology can occur to the extent that a producer will use it as a communication or storage device. It is argued that such collaboration will continue the trend of small and medium producers to digitally communicate or store information; but, the analytical knowledge possible with digital technology use will be

underdeveloped and, instead, for the time being, will continue to be built on information assembled externally to the enterprise.

2:00pm – 2:30pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Grain footprint: An ecological-economic analysis of sustainable resource production and consumption in Australia

Mr Gazi Uddin (University of Southern Queensland), Associate Professor Khorshed Alam (University of Southern Queensland), Professor Jeffrey Gow (University of Southern Queensland)

Introduction: Ecological Footprint Analysis (EFA) is used to assess the impacts of human activities on the environment for a defined population. One of the strengths of EFA is its ability to make comparisons between resources consumed and resources available and then demonstrate how ecologically sustainable those consumption patterns are.

Aim: The main purpose of this paper is to identify the size of ecological footprint (EF) of grain crops in Australia in order to assess the degree of sustainability in their production.

Methods: The paper uses both Remote Sensing and Geographic Information System (GIS) techniques and EFA to assess the available resources to compare consumption to production. An integration of EF and GIS allows the identification of spatial patterns, trends and factors that shape the sustainability of grain production.

Data: This paper uses various land-use, population and socio-economic data from secondary sources mainly from the Australian Bureau of Statistics, the Global Footprint Network and the Australian National Footprint Accounts.

Results: This paper estimates the EF of the grain industries in Australia to be higher than the sustainable level. Several factors influence the size of the EF of the grain industry, including the quantities of grain production, the quantities of grain consumption, the area of agricultural land used in growing grain, the size of population, the amount of energy inputs (nitrogen, diesel fuel, fossil fuel, biofuels etc.), and the amount of other farm inputs (fertilisers, herbicides, insecticides, fungicides etc.).

Conclusions: This paper highlights the ways of managing EF comparing it with available ecological resources. This combined analysis can provide a more comprehensive account of the sustainability of grain consumption in Australia. Given its importance, this paper shows the policy directions to improve sustainability in the Australian grain industry.

2:00pm – 2:30pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Digital storytelling, Facebook and mediated identities: Raising aspirations for rural youth within the USQ Tertiary Preparation Program Intensive School

Dr Susan Hopkins (University of Southern Queensland), Ms Naomi Ryan (University of Southern Queensland)

The Open Access College of the University of Southern Queensland conducts a Tertiary Preparation Program (TPP) in Intensive mode for Year 12 school leavers as an initiative to widen participation and raise aspirations of economically and geographically disadvantaged youth. Funded through the Australian Government's Higher Education Participation and Partnerships Program (HEPPP), the TPP Intensive School (TPPIS) targets 17-18 year olds from specific low SES secondary schools across Toowoomba and surrounding Darling Downs Districts, including students from rural communities such as Millmerran and Pittsworth. The USQ TPP Intensive School, which commenced in Semester 3 2012, provides not only fee-free tuition, but also free transport, meals and accommodation in the University Residential College for students from rural areas. To strengthen the Career Development Learning (CDL) component of the TPP Intensive program, an innovative digital storytelling project designed for pre-tertiary students in intensive mode was introduced in 2013. The TPPIS students were required to produce a short film (3-5 minutes in length) employing moving and still images with voice over audio or narration to explore their identity and future aspirations, their career journey to date, influences on their decisions, their skills, abilities, interests and goals. Through digital storytelling, and the TPPIS Facebook closed group page, the TPPIS program provided an avenue for participants to explore new student identities and develop a sense of community, while engaging with academic content on a visual platform that 'speaks their language'. The outcome of adding Social Media networking and Digital Storytelling to the TPPIS teaching toolkit has been very successful with increased opportunities for students from low socio-economic backgrounds to transition to university culture, to expand their social networks and develop necessary career management competencies and digital literacies. A selection of TPPIS 2013/2014 students' Digital Stories will be screened as the audio/visual component of this presentation.

2:00pm – 2:30pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Enhancing participation for rural development: Directions for digital technologies

Dr Ann Starasts (University of Southern Queensland), Professor Mike Keppell (University of Southern Queensland)

Regional Futures, Agricultural Futures, Digital Futures

Knowledge building and learning are key strategies of innovation in agriculture as these contribute to the future viability of rural communities. They are especially important in meeting industry and farm level challenges such as sustainability, profitability and climate variability. Farmers attempt to maximise their production and profitability by using increasing volumes of digital information and precision systems data. Deciphering and synthesising this data is fast becoming an essential area of focus for agricultural communities.

Farmers' learning and knowledge processes are often local and social, involving sharing of experiences. Traditional group and participatory agricultural development and training programs support these processes. Social media, webinars, and blogs about farm experiences enhance access to knowledge, promote sharing of resources, and enable some delivery to large numbers of farmers.

As technology-based information and communications increase within agriculture, there is an opportunity to consider how they can enhance traditional processes and structures of learning and building knowledge. This opportunity will focus on new forms of communication, access to information relevant to needs, and connections in both the local and global context. Social media, communication technologies and digital literacy skills will be core to these new opportunities.

Technology-based systems will serve both community and individual farmers' knowledge needs if they have a local focus and interface with industry level systems and issues. An imperative for future technology-based facilitation of agricultural development and training is engagement with individual businesses and local communities to enable their participation in industry thinking, direction setting, and programs. Groups and individual businesses could be enhancing capacities for interaction within digital environments. A focus on people, their experiences and ongoing dialogue and knowledge opportunities about issues will enhance participation.

2:30pm – 3:00pm

Parallel Session: Regional Futures

Venue: Toowoomba Regional Council Room, R113

A phenomenography of adult learning in a rural Australian community informatics project: Understanding, facilitating and accounting for learning in GraniteNet

Ms Catherine Arden (University of Southern Queensland)

GraniteNet is a community technology (Community Informatics) project, which began in 2006 as a research and development collaboration between USQ researchers and members of the rural community of Stanthorpe, a town of approximately 10,500 residents located on the Granite Belt in the Southern Downs. The vision for this Participatory Action Research project was a sustainable community designed, owned and managed web portal that would promote digital inclusion and support Stanthorpe's development as a learning community. Eight years on, GraniteNet has continued to evolve as a community-based

social enterprise operated exclusively by volunteers, providing a range of digital inclusion facilities and services to residents of Stanthorpe and the Granite Belt, including a community technology hub located in the CBD and a community web portal (www.granitenet.com.au).

This presentation reports the findings of doctoral research conducted during 2011-13 investigating community members' conceptions and experiences of learning in the context of their involvement in and use of GraniteNet. Although experiences of informal adult learning across various content domains were explored, particular emphasis is given to understanding respondents' perceptions and experiences of using, and learning to use, emerging digital technologies in the context of their engagement in GraniteNet's physical and virtual activities and environments.

The study's findings and methodology will be of interest to researchers and practitioners in Community Informatics, Adult Education and Lifelong Learning, Community Development and Community Engagement and in particular those interested in the subjective experience of the 'digital divide', digital inclusion and digital literacies in the 'third sector' of Australian rural community life. The findings are of particular interest to members of GraniteNet's diverse communities and will be used to support the ongoing development of Community Informatics practice at the local level.

2:30pm – 3:00pm

Parallel Session: Agricultural Futures

Venue: NCEA Room, L206

Use of ICTs in the Australian cotton industry

Dr Sayan Chakrabarty (University of Southern Queensland), Dr John Bennett (University of Southern Queensland)

According to the Department of Agriculture, Australian Government (2013), agriculture is facing an uncertain environment due to natural resource decline (salinity, acidity, nutrient loss, competition for water, etc.), the impacts of climate change, particularly potential declines in annual average rainfall in many regions of Australia, and biosecurity threats (invasive plants and animals, diseases, etc.). To fight against exogenous (mostly uncontrolled), unfavourable changing situations, 'knowledge sharing' among farmers is one of the most important elements in Australian agriculture to build resilience. While other, more urban based, industries have been quick to harness ICTs for the sharing of knowledge, and to increase profit margins, agriculture has been comparatively slow. This is largely due to geographical service constraints and reportedly influenced by an aging demographic with comparatively lower digital literacy.

Through the Australian cotton industry annual survey, "Cotton Growing Practices 2013" (Roth Rural Pty Ltd 2013), questions around the use of ICTs on cotton farmers in Australia sought to discover which ICT tools they use in irrigated and dryland cotton farms in Australia, in order to understand elements of need, preference and demand from growers as well as provide insights for digital literacy. A secondary focus assumed that ICT is important to the industry future and sought to understand what growers wanted to see in

the creation of smart phone/tablet applications, as well as the usefulness of existing applications. This survey covered approximately 23% of the irrigated cotton area and 27% of the dryland cotton area. Our analysis explores the role of ICT for obtaining information about farming systems, preferred mechanisms for receiving information about cotton research and development. We also identify respondents' perceptions on whether cotton specific mobiles apps could help in their decision process and what types of apps they would like to see for cotton related information.

2:30pm – 3:00pm

Parallel Session: Agricultural Futures

Venue: DAFF Q Room, L209

Forecasting water market prices in the Murray-Darling basin using Hybrid - Artificial Neural Network (ANN) - Bayesian Modelling – Approach

Dr Tai Nguyen-Ky (University of Southern Queensland), Dr Shahbaz Mushtaq (University of Southern Queensland), Dr Duc-Anh An-Vo (University of Southern Queensland), Dr Duc Ngo-Cong (University of Southern Queensland)

Climatic changes are putting unprecedented pressure on water resources in Australia. The pressure emanates from temporal and spatial shifts in the distribution of rainfall, altering seasonal water availability and allocation. To be efficient, irrigators need to manage their exposure to the risks associated with changing water allocation. Water markets facilitate adjustment to water scarcity and competition. Farmers can choose temporary water sales or purchase additional supplies to manage climate risks, but lack of information on seasonal water allocation and market prices impedes efficient water management decisions by farmers. Erroneous decisions can cost farmers in terms of lost investments and income. Prior and reliable information on water prices could help irrigators make better decisions when developing cropping plans. The paper proposes a hybrid, Artificial Neural Network based-Bayesian Modelling, approach to forecast seasonal water trading prices. The model is applied to Murray Irrigation Limited in NSW, Australia.

Three models (basic, intermediate and full models), with different sets of variables (such as historical temporary water trading price, general security water allocation, cereal-grape-meat prices) that influence water trading prices, were considered. The hybrid approach, compared with autoregressive integrated moving average and ANN models, shows better ability to forecast water trading prices, given its ability to integrate with ANN and capacity to simulate complex and non-linear processes. All three models predict water trading prices with high degree of accuracy ($R_{\text{BASIC}}=0.85$, $R_{\text{INTERMEDIATE}}=0.98$ and $R_{\text{FULL}}=0.98$). Variables that influence the price of water allocations include current water prices, water allocation levels and the prices of major crops. This model can be integrated with online data systems to assist irrigators in making water trading decisions. The ability to forecast water trading prices, for instance, the temporary water trading prices, could be crucial for increasing the productivity and profitability of agriculture.

2:30pm – 3:00pm

Parallel Session: Digital Futures

Venue: DSITIA Room, C204

Internet usage, social capital and economic growth in OECD countries: Lessons for Australia

Mr Mohammad Salahuddin (University of Southern Queensland), Associate Professor Khorshed Alam (University of Southern Queensland)

This study examines the relationship among Internet usage, social capital and economic growth using panel data for 20 OECD countries for the period 1985-2010. It estimates an encompassing model of short and long-run effects using the Pooled Mean Group regression technique developed by Pesaran and Shin (1999) in the presence of cross-sectional dependence. The innovation of this study lies in the application of such a regression technique in the Internet usage, social capital and economic growth literature using one of the largest sample periods so far. The findings suggest a positive long run relationship between Internet usage and economic growth at 10% level of significance, and a negative but insignificant short-run relationship between them. The estimation results further indicate an insignificant positive relationship both in the short-run and the long-run between social capital and economic growth. The most fascinating finding of this study is that the interaction effect of social capital and the Internet usage on economic growth is positive and highly significant. Such findings have important policy implications for the OECD countries including Australia. Most recent studies dealing with the digital divide in Australia strongly recommend the incorporation of the issue of social capital in framing effective policies and strategies to bridge the digital divide. The positive combined effect of social capital and Internet usage on economic growth in this study lends strong support to this view.

2:30pm – 3:00pm

Parallel Session: Digital Futures

Venue: ADFI Room, S108

Affordance theory and university teachers' interactions with their online students at an Australian university: Implications for digital rural futures

Dr M S Arifeen Khan Mamun (University of Southern Queensland), Dr Mohammad Mafizur Rahman (University of Southern Queensland), Professor Patrick Danaher (University of Southern Queensland)

Contemporary scholarship agrees that the factors influencing teacher–student interactions in online environments are diverse and multiple, and are framed by a complex set of historically grounded and socially mediated forces. One potentially fruitful way to interrogate these factors and forces is to draw on aspects of affordance theory, by examining the kinds of relationships and learning outcomes that are (and are not) afforded by particular digital technologies in those online environments. This paper applies elements of affordance theory to explore academics' experiences of using Study desk,

Moodle, E-mail, etc. to teach students online at a single Australian university. Data was collected from focus group discussions that took place in November and December 2013. The research design was an exploratory, mixed method, case study incorporating inductive, thematic analysis of emergent themes linked with current literature. While reflecting a wide range of disciplinary backgrounds and educational philosophies, the participating academics articulated a number of common concerns informing their attitudes to and experiences of using digital technologies with their students. These concerns encompassed several ideas clustered around the notions of time (including work intensification, being continually available to their students and colleagues and the complexities of synchronous and asynchronous teaching and learning) and of space (including effective and efficient ways of constructing the space of the digital learning environment and the diverse spaces in which their students engage in learning).

More broadly, affordance theory emerges as a useful conceptual lens for understanding the influences on and the impacts of teacher–student interactions using digital technologies in online environments. For instance, by explicating the otherwise tacit but nevertheless powerful forces shaping such interactions and environments. Those influences and impacts in turn are crucial to (re-)visioning digital rural futures in universities in Australia.

Poster Presentation Abstracts

All posters will be on display throughout the conference in the Allison Dickson Foyer (H102).

Agricultural Futures

Poster #1. Using digital technology to quantify group-typical behaviours of cattle

Mr Christopher Noble (CQUniversity), Professor Dave Swain (CQUniversity)

Future grazing systems will have an increased focus on grazing behaviour and the links with genetics and social learning. In remote locations, a realistic option for the generation of information on genetic fitness, the number of offspring that survive to reproductive age relative to the average of the population, is via the use of biotelemetry monitoring technologies. These technologies need to generate data at intervals that are relevant to the links between sociality and the underlying physiological processes. Heritability, or variation in a trait due to the variation in genetic factors of growth, and product traits are well established; but, similar estimates of reproduction and adaptation in the rangelands are poorly advanced.

There is a gap in knowledge of the interaction between livestock genetics and our current understanding of rangeland fitness. Although there are no empirical data that cattle possess a 'culture', there is substantial anecdotal evidence that, independent of genetic inheritance, socially learned information is a fundamental characteristic of cattle behaviour. Regardless of the genetic and/or cultural origins, group-typical behavioural patterns would be expected to contribute to fitness.

A CQUniversity study aims to identify group-typical social behaviours that impact on rangeland fitness. Digital technology is providing the opportunity to quantify social-sexual-maternal behaviours which aim to generate data that will: improve calf survival – crèche formation – as an anti-predator mechanism; fertility – participation in sexually active groups during oestrus; grazing distribution – temporal and spatial animal sub-groupings; and allogrooming as a means of both cattle tick control and social enrichment. Using digital technology to generate group-typical data has the potential to ensure not only the economic, but also the environmental, sustainability of rangeland production systems.

Poster #2. Simulations of water surface layer under influence of wind-generated waves

Dr Andrew Wandel (University of Southern Queensland), Mr Wesley Williams, Mr Edward Greig

Minimising the evaporation of water from storages is a significant issue facing agriculture. It is well known that wind increases the evaporation rate by maintaining a lower relative humidity in the air, while increasing the total surface area of the water by generating waves. However, it is still unknown how the processes that occur near the surface of the water control the evaporation rate. The current study seeks to address this by conducting

high-resolution simulations of the upper region of the water. The improved understanding of the behaviour obtained from the results could result in better evaporation-management strategies being adopted. In particular, the behaviour of monolayers (which form a thin barrier on the water's surface to reduce the evaporation rate) is very sensitive to the nature of the fluid motion in the very shallow depths.

Poster #3. Reinventing drought risk management in Australian agriculture

Mr Adewuyi Ayodele Adeyinka (University of Southern Queensland), Professor Chandrasekhar Krishnamurti (University of Southern Queensland), Dr Tek Narayan Maraseni (University of Southern Queensland), Professor Julie Cotter (University of Southern Queensland)

We analysed the responses of some stakeholders in Australian agriculture. These stakeholders were selected from finance industry (banking and insurance), farmer unions and farmers themselves. The data was collected through telephone and focus group interviews. The risk exposure of farmers, their awareness of risk management options and assessment of policy evolution were related to the theory of incentives. Policy implications of options were analysed and compared in terms of efficiency and equity. We concluded that a mix of social supports and market-based options under tax incentives in the absence of disaster aids would lead to a pareto-improved policy for rural Australia and the economy at large.

Poster #4. Web-based 'discussion-support' tools to manage climate risk: Novel digital approaches to support farmer learning in a shrinking agriculture extension service sector

Mr Neil Cliffe (University of Southern Queensland), Professor Roger Stone (University of Southern Queensland), Dr Kathryn Reardon-Smith (University of Southern Queensland), Dr Helen Farley (University of Southern Queensland), Dr Shahbaz Mushtaq (University of Southern Queensland), Ms Joanne Doyle (University of Southern Queensland), Mr Neil Martin (University of Southern Queensland), Dr Jeff Coutts (Coutts J & R Pty Ltd), Dr Tek Maraseni (University of Southern Queensland), Dr Adam Loch (University of South Australia), Associate Professor Janette Lindesay (Australian National University), Mr Matt Kealley (Canegrowers Queensland), Dr Jenny Ostini (University of Southern Queensland)

This paper reports on research trialling a novel and cost-effective approach to agricultural extension that potentially addresses challenges facing traditional extension methods. Historically, farmers had opportunities to participate in climate risk management workshops to learn about and apply climate forecast information in their own situation. Facilitated group discussions supported individual learning, skill development and improved decision-making related to workshop content. However, opportunities to participate in workshop activities are declining in agriculture due to reduced institutional and investment support for extension services. Alternative innovative approaches are therefore needed to provide the benefits of social learning through supporting farmer

initiated, self-generated group discussion without advisers or consultants. Leveraging advantages of digital technologies may cost effectively address declines in advisory services and retain capacity to promote group discussion, learning and decision making. This research trials novel "discussion support" tools created as customised virtual world (Second Life) videos or machinima. Professional machinima makers were engaged to develop backgrounds identifiable as Australian sugar cane farms, avatars of sugar cane farmers and other characters. Avatar conversations were scripted to capture farm management issues affected by climate risk. Script recording used actor's voices, selected to imitate cane farmer idiom and expression, and filming using screen capture technology. Evaluation of a prototype machinima indicates the potential usefulness of machinima to support discussion of climate risk and other industry issues and provided guidance for future product development. Four further machinima have been produced to address different management issues in the sugar industry. These will be trialled with farmer groups to develop a detailed understanding of the capacity of the tools to promote discussion and support farmer learning and skill development.

Poster #5. Determining early summer crop area estimates through the use of sequential MODIS EVI satellite imagery for Queensland

Mr Peter Davis (Department of Agriculture, Fisheries and Forestry, Queensland), Associate Professor Armando Apan (University of Southern Queensland), Dr Andries Potgieter (University of Southern Queensland)

This project aimed to determine whether MODIS satellite imagery can be used to effectively predict crop area estimates of summer crops throughout the crop growing season for QLD. Here we investigate the ability of simple metrics to capture total summer crop area estimates. Actual total summer crop figures from the Australian Bureau of Statistics (ABS) census data were used for comparison and included eight of the main summer crops for Queensland; i.e. sorghum, cotton, maize, sunflower, rice, soybean, peanuts, and mung-beans. The approach taken here for determining total summer crop area is the creation of a simple threshold metric that encapsulates the green-up of crop growth at different periods throughout the growing season. Temporal enhanced vegetation index (EVI) value profiles were created through layer stacking of the MODIS MOD13Q1 16-day EVI images from 1st Oct 2010 to 1st April 2011. The simple EVI threshold (EVIT) cut-offs that were used are 500, 1000, 1500 and 2000. In addition, total crop area estimates were calculated with and without the latest cropping land use mask within each of the shire boundaries for 2011. Preliminary results show that total summer crop area estimates for each EVIT (masked) have appreciably high correlations in capturing actual shire scale summer crop area estimates across the QLD cropping region for 2010/11. The effect of land use mask is important in discriminating crops from non-crops and thus final total summer cropping area estimates. More specifically, enhanced accuracy and lead-time exist in the determining of early-season crop area estimates for areas throughout SEQ and SWQ than that of CQ. The period of highest accuracy and lead-time concurred with peak canopy (maximum EVI). Integration of such crop area estimates will enhance the ability to more accurately determine total production estimates that can be used by industry to better manage their resources well ahead of harvest.

Poster #6. Optimising farming system efficiency through technologically informed constraint mitigation and identification of the interactions of risk factors

Mr Joseph FitzGerald (University of Southern Queensland), Dr Troy Jensen (University of Southern Queensland), Dr John Bennett (University of Southern Queensland)

Currently, farming system decisions are primarily analogue and system efficiency is limited by the ability to critically analyse numerous information sources for an informed and optimal decision. Compounding this, while farmers often have a reasonable idea of system constraints, they may not necessarily know at what point these constraints critically affect production; i.e. at what level should the farmer become concerned about a particular constraint. Intelligent systems, harnessing technological sensing and data management, offer a suite of tools that could be utilised to inform constraint management with critical thresholds identified for each constraint.

The Hazard Analysis and Critical Control Point system requires the application of a set of principles across a system to allow hazard identification and control. By applying the HACCP approach to farming systems, beyond the current use in food safety, it is regarded that: constrained environmental, social and economic outcomes will be reduced; production efficiency and output will increase; and, the longevity of agricultural resources, such as soil, will be improved. Implementing HACCP into a farming system could utilise technology and will require identification of the major production constraints. Ideally, information fed into HACCP will be gathered automatically and remotely using sensing technology.

Constraint likelihood can be quantified further through the use of models such as Bayesian belief networks (BBN). This understanding, in conjunction with HACCP, is important in that it allows assessment of vulnerability and exposure, as well the relative impact of an identified constraint on the farming system. A major advantage of the BBN approach is the ability to utilise quantitative and qualitative data to provide both a diagnostic and a probabilistic model for constraint analysis. This work discusses the feasibility of digitally integrating HACCP with BBNs as a means to optimise farming system decision process and increase on-farm resilience to constraints.

Poster #7. Online information to maximise soil health

Dr Peter Dahlhaus (Federation University), Mr Andrew MacLeod (Federation University), Ms Kirsten McKenna (Federation University), Mr Robert Milne (Federation University), Dr Helen Thompson (Federation University)

Recognition of the agricultural potential of the Corangamite region in South West Victoria dates to the earliest exploration reports and was largely responsible for the region's early pastoral settlement. Not surprisingly, then, the region has been a focus for government soil surveys, resulting in relatively complete soil information when compared to other parts of Australia. With changes in government departments, much of this legacy soil data and

knowledge has been consigned to archives and is largely forgotten or ignored in current agricultural research and development. A project was initiated by the Corangamite Catchment Management Authority, to construct an online repository of soil health information and knowledge: including reports, research papers, maps and descriptions related to current and past soil series mapping, land capability and suitability assessments, agricultural trials, and soil research and investigations.

Historically, providing access to directories of documents and information databases has not necessarily informed practice change and research. Hence new approaches focussed on answering the community's frequently asked questions on soil health are being piloted in the Corangamite region. By spatially enabling the data, users can focus on their site of interest to gather relevant and informative answers to their questions via an intuitive-to-use web-portal. The value of soil health information requires dynamic synthesis of the datasets to maximise their best use in terms of:

- Identifying what actions are needed to improve agricultural soils;
- Enhancing opportunities to attract funding and research expertise;
- Enabling activities that may be achieved with collective action;
- Sharing knowledge and expertise to build skills and capacity; and
- Avoiding duplication of effort.

This repository of soil health knowledge is readily accessible to the community and presented in a way that makes it informative, relevant and useful to the needs of the land managers.

Poster #8. Using big data to demonstrate the value chain in the Australian thoroughbred racing industry

Associate Professor Jane Summers (University of Southern Queensland), Dr Karen Miller (University of Southern Queensland)

The Australian thoroughbred racing industry contributes a large financial contribution to the agricultural sector through its direct and indirect industry connections. The value chain for thoroughbred racing can be broadly divided into four sectors: breeding; buying and selling; racing; and owning. We explore the value exchange in each sector by interrogating the information provided by big data. The breeding sector alone contributed A\$11,542,300 to the 2012/2013 breeding season in stallion fees and engages approximately 95,500 individuals in the game of owning race horses. Total returns to race horse owners in the 2012/2013 racing year were A\$55,500,109 or an average of A\$5,795 per person. Of all the live race horse foals born each year (14,500 in 2013) only about half go on to race and, of those, a small percentage return any winnings to their owners. This investigation uses the information gained from an analysis of big data about the thoroughbred racing industry to highlight that the "Value" to those involved in the industry can be explained in terms of utilitarian, hedonic and social value. The data also confirms that there is a very small monetary or return on investment gain, in the majority of cases, when breeding, owning, racing and/or buying a race horse. This leads the researchers to conclude that in the majority of cases the motivations for breeding, owning and racing a thoroughbred horse

are mainly hedonic and/or social and that the value perceived in the process comes from subjective and status based rewards and not from any real expectation of tangible financial rewards. Those in associated or ancillary service areas, such as veterinary support, farriers, feed merchants, trainers and saddlers, make the most returns in the sector.

Poster #9. Numerical modelling of moisture motion in heterogeneous soils using 1D-MIRBF method

Dr Duc Ngo-Cong (University of Southern Queensland), Dr Duc-Anh An-Vo, Dr Tai Nguyen-Ky

In the present paper, we develop an efficient and accurate numerical approach based on one-dimensional-moving integrated radial basis function (1D-MIRBF) and fully implicit modified Picard method for simulating fluid movement in heterogeneous soils governed by the highly non-linear Richards equation. The major advantages of the proposed 1D-MIRBF method include (i) a banded sparse system matrix that helps reduce the computational cost; (ii) the Kronecker Delta property of the constructed shape functions, which helps impose the essential boundary conditions in an exact manner; and (iii) high accuracy and fast convergence rate owing to the use of the IRBF approximation. The performance of the present method is demonstrated through several 1--D and 2--D soil infiltration problems. Numerical results obtained are in agreement with other published results in the literature. This solver for moisture motion in soils will be incorporated into a surface-water-flow solver to handle the surface irrigation problem.

Poster #10. The role of technology in designing weather-based micro insurance for broad acre wheat farmers in Queensland and Western Australia

Mr Adewuyi Ayodele Adeyinka (University of Southern Queensland), Professor Chandrasekhar Krishnamurti (University of Southern Queensland), Dr Tek Maraseni (University of Southern Queensland)

In this study, the efficiency of rainfall-index insurance contract was analysed using Certainty Equivalence of Revenue (CER) of farmers. Rainfall data was collected from the Bureau of Meteorology (BoM) Australia, and the yield data used in the analysis was based on the simulation from OZ-wheat. The insurance contract was designed using Standardised Precipitation Index (SPI). The results show that the efficiency of weather index insurance varies across the two states from shire to shire and across the strikes or drought benchmarks. It was also noted that capturing the susceptibility of wheat to the crop growth cycle improved the efficiency of the contracts and the analysis of the capping effect, which accounts for the water retention capacity of the soil typology, varies between the two states. It was concluded that weather index insurance could be a promising tool in facilitating response to drought risk. However, for the insurance to be part of the arsenal of market options available for Australian farmers, there is a need for government to provide the technological infrastructure, including protected real time weather stations and Doppler Radar Technology (DRT), to enhance higher spatial resolution of weather readings from paddock to paddock. This provision would help reduce basis risk in the provision of weather insurance and protect the counterparties to the contracts against fraud.

Poster #11. A theoretical explanation of the effect of recent policy change on agro-risk management in rural Australia

Mr Adewuyi Ayodele Adeyinka (University of Southern Queensland), Dr Tek Narayan Maraseni (University of Southern Queensland), Professor Chandrasekhar Krishnamurti (University of Southern Queensland)

Before now, the governments of Australia have offered drought relief payments to farmers in times of drought. The programme has been phased out on the grounds of inequity and inefficiency. The current policy embraces all forms of risks Australian farmers are exposed to and offers them the main-stream welfare benefits by waiving the asset test that hitherto disqualified them from assessing these benefits. Currently, the majority of Australian family farms are not profitable and it has been argued that subsidies, in whatever form, will cause these farmers to hold onto their land, which they could have given up to those farmers who are better managers, particularly the bigger corporate farms. A school of thought expects this takeover to lead to a higher productivity in the long-run. In this paper, we considered the effect of recent policy evolution on agro-risk management in rural Australia under three different propositions using basic mathematics. We argued that the current policy may be grossly inefficient in that it will reduce production as farmers have additional incentives to be unprofitable and would demand higher prices for their land in contrast to expectations. Our theoretical propositions revealed that a mix of welfare benefits and tax incentives on insurance premium could lead to a pareto-improvement in Australian agriculture. Based on the literature, we showed that evidence of the efficiency of corporate farms are mixed and that family farms would still have major roles to play in Australia's rural future.

Regional Futures

Poster #12. Migration and urban development of ICT: A case study of the Northern Territory, Australia

Dr Jiaping Wu (CQUniversity)

The implications of information and communication technologies (ICTs) for urban and regional development have been studied extensively. Literature concerning regional development has focus mainly on the 'digital divide' and spatial inequality. This study uses Northern Territory, Australia, as a case study. It is a vast geographic region with a large proportion of Aboriginal population and long distances to other population centres. The paper examines the relationships between ICT application and regional development and especially how ICTs do the 'work' concerning migration development and urbanisation at a regional level. ICTs are widely incorporated into social and economic systems and have reshaped geographies of the labour market within the region. These have effects on mobility of the population. Non-Aboriginal population are increasingly concentrated in Darwin, while Aboriginal people are progressively migrating to large regional towns. The population geography of the Northern Territory has profoundly changed.

Poster #13. Researching regional impact: The challenges and complexities

Ms Joanne Doyle (University of Southern Queensland), Professor Michael Cuthill (University of Southern Queensland), Dr Lisa McDonald (University of Southern Queensland), Professor Mike Keppell (University of Southern Queensland)

In this presentation, I will outline the focus of my PhD research project, which is assessing the research impact of USQ's Collaborative Research Network (CRN) Digital Futures program. I will provide an overview of my research to date and explain the challenges and complexities of researching the impact of research in a regional setting.

The issue of research impact has recently been brought into sharp focus by the changing role of the university. The role of a university has traditionally revolved around teaching, research and service. Over recent times, the role of universities has expanded to include innovation and commercialisation, regional development and community engagement. Universities actively contribute to policy development, sustainability initiatives and social improvement programs.

With the majority of Higher Education research activities being funded by the public sector, universities are under increasing pressure to demonstrate research effectiveness in terms of economic, environmental and social impact.

The reality of research impact is that it is difficult to measure. It is much easier to articulate research outcomes and measure research outputs. The focus of impact assessment becomes more about developing and disseminating research outputs and less about the economic, environmental and social impact of research. Too frequently, academic impact is evaluated in terms of altmetrics, citation analysis and journal impact factors.

Poster #14. Growing regional aspirations and support for learning: Role for technology

Dr Ann Starasts (University of Southern Queensland)

Disparities exist between numbers of regional and metropolitan students participating in Higher Education in Australia. Regional citizens are around half as likely to study at University as metropolitan citizens. This discrepancy continues even as more study programs are available online. Reducing it is a priority for Governments as education translates into improved incomes, health and social connections.

Analysis of widening participation and Australian youth studies, along with interviews, contributed to the development of initial research directions for employing digital tools to help build capacities and interest in education and learning opportunities.

Aspirations, options and choices of young regional adults for future careers appear to be grounded in their everyday realities - their local and family connections and the everyday array of information available to them. The real value of digital technology in the widening participation arena appears to be in connecting people with people - to inspire and mentor, and widen exposure to new information.

Digital technologies can:

- Provide learning opportunities beyond what is available locally, relevant to individual interests;
- Allow connections with inspiring stories, people and role models from all walks of life, careers and industries;
- Provide tools to help identify pathways to learning opportunities and related jobs; and
- Connect isolated external students with discipline-based mentors and tutors, and community networks.

There are local implications of lower educational aspirations and access in regional communities. This research suggests there is scope for communities to develop local strategies to enhance inspiration for learning and education. Future directions for supporting the widening of participation in educational opportunities for regional citizens could incorporate both a local and a digital dimension, and consider local community strengths, networks, and needs as well as individual needs.

Poster #15. Applying the Queensland Agricultural Land Audit

Ms Rebecca Paine (Department of Agriculture, Fisheries and Forestry, Queensland), Ms Stephanie Denman (Department of Agriculture, Fisheries and Forestry, Queensland), Ms Heather Taylor, (Department of Agriculture, Fisheries and Forestry, Queensland), Ms Lea Diffey (Department of Agriculture, Fisheries and Forestry, Queensland), Mr Christopher Holloway (Department of Agriculture, Fisheries and Forestry, Queensland), Mr Phil Norman (Department of Science, Information Technology, Innovation and the Arts, Queensland)

The Queensland Agricultural Land Audit was released in May 2013. It identifies land important to current and future agricultural production across Queensland. It had been more than 30 years since a similar study was last conducted in Queensland.

A fit-for-purpose method was developed for the Audit using established approaches and existing datasets. The Audit sought to provide information on the location, extent and character of land currently used for agriculture across Queensland; identify areas with potential for future agricultural development; and identify constraints on current or future realisation of that potential.

The results of the Audit are presented in a report that includes a state-wide overview and a chapter for each region. Each chapter provides information and maps regarding socio-economic data, overlapping land uses, infrastructure and other opportunities and constraints to agricultural development in the region. Agricultural potential was mapped by applying rules to identify land with characteristics that best match the requirements of each Agricultural Land Use Category.

The purpose of phase two of the Audit (in progress) is to use the information contained within it for a broad range of future agricultural development outcomes. A variety of technologies are being used to communicate Audit information to a multiplicity of

stakeholders, such as web-based mapping of future agricultural potential for planners and industry, and geo-processed reports for potential investors.

Ensuring that Audit information is accessible in a variety of digital formats to a variety of potential stakeholders has been central to the purpose of phase two. By making all Audit information, including spatial datasets, publicly available, it is envisaged that stakeholders may adapt Audit information beyond phase two products to digital formats that best suit different industries.

Digital Futures

Poster #16. Digital literacy: Moving from buzzwords towards a social construction of competency

Dr Jenny Ostini (University of Southern Queensland)

A preliminary exploration of everyday digital literacy.

What is digital literacy? Is it something that we want or need to have? Do we have to be able to measure it? What does it mean in practice? Is it relevant in universities?

This paper will give a brief introduction to some of the common ideas about digital literacy being used today in education and research. It will then look at ways of studying digital literacy in the field, and give some examples from recent fieldwork.

Stories are a powerful way of accessing people's understanding of the world in which they live. Not only what people say, but how they say it, the words they choose to use and the importance placed on different aspects of the story all reveal the meaning they are creating for themselves and others. To understand what digital literacy means in practice, it is important to examine people's stories -- their narratives -- of their digital experience and what they see as the essential components of their digital literacy or otherwise.

Of interest to this project is not to define digital literacy, as there is extensive existing literature on the subject, but to gain an understanding of what digital literacy means in practice for people's everyday working and learning lives. This understanding may feed into a better understanding of the definition of digital literacy but its main goal is to look at what digital literacy means for individuals and groups. The focus is less on functional skills but on how people themselves conceptualise and articulate their understanding of the technology that many use daily. Research (Lovell and Baker 2009) indicates that assumptions about "digital nativity" on the part of university students may be just that and that many students have not had "universal and uniform digital upbringing" (Kennedy, Judd et al. 2008). Some of the stories shared here may illustrate just that.

A secondary aim is to shed light on people's behaviours and choices in relation to digital technology that can contribute to a number of fields working with the concept of digital literacy.

Stories from current work-in-progress will be shared about how people experience digital technology and how they understand that experience. These stories will be examined to try to answer questions about what meanings people create for themselves around their

experience. The social context of digital technology, and the rules and norms around technology use, that have an impact on people's comfort with, and ability to use, digital technology will also be discussed.

Poster #17. Embracing student mobility: Understanding, enabling and facilitating the mobile aspirations of higher education students

Dr Angela Murphy (University of Southern Queensland), Dr Helen Farley (University of Southern Queensland), Professor Andy Koronios (University of South Australia), Associate Professor Chris Johnson (Australian National University), Dr Michael Lane (University of Southern Queensland), Dr Abdul Hafeez-Baig (University of Southern Queensland), Associate Professor Brad Carter (University of Southern Queensland), Dr Warren Midgley (University of Southern Queensland), Associate Professor Stijn Dekeyser (University of Southern Queensland)

Although distance education had its roots in Australia more than half a century ago with the 'School of the Air', Internet and mobile technologies are promising to make electrifying changes to this mode of learning. These technologies could deliver significant benefits to students living in regional, rural and remote communities. In order to study flexibly and opportunistically across the complex dimensions of a student's life, many students have the expectation that they can access course content and engage in meaningful learning activities while mobile. Unfortunately, universities are still playing catch-up in terms of technological support for mobile devices and sound pedagogy for leveraging the learning opportunities that exist for students in mobile environments. A recent study was undertaken by three partnering Australian Universities: the University of Southern Queensland, the University of South Australia and the Australian National University to identify the implications of these changing trends for Higher Education policy and infrastructure. A series of focus-group sessions were held to qualitatively explore the adoption of mobile technologies and the mobile learning trends and preferences of students at each of these three institutions. Findings from this study clearly indicate that students are active users of mobile technologies despite existing barriers. Students have also independently developed new learning strategies to effectively use the affordances of mobile technologies to enhance their learning practices. This presentation will provide a snapshot of the key themes that emerged from this study as well as discuss strategies that can be utilised effectively by higher education institutions to support mobile access and enhance the student learning experience. The use of these strategies has the potential to improve student engagement with coursework as well as encourage greater engagement with both online and on-campus learning environments.

Poster #18. Does Facebook build social capital in rural and regional households? A case study of Western Downs Shire

Dr Michael Lane (University of Southern Queensland), Mr Sanjib Tiwari (University of Southern Queensland), Associate Professor Margee Hume (University of Southern Queensland)

Social networking sites have grown exponentially in the last 5 years. Facebook in particular now has over one billion active user accounts. Much research has been done on Facebook and its impact on society and business in general. However, to our knowledge, little specific research has been conducted on the impact of social networking sites, such as Facebook, on households in rural and regional communities. Hence we are investigating the extent to which Facebook is building social capital in households within Western Downs Shire (WDS).

Social capital can be defined as the links, shared values and understandings in society that enable individuals and groups to trust each other and so work together. Social capital is classified for the purpose of this study into bridging capital and bonding capital. Bridging capital builds links that reach beyond a shared sense of identity, to distant friends, colleagues and associates. Bonding capital builds links to people based on a sense of common identity such as family, close friends and relatives.

Our initial findings indicate that Facebook is widely used by households in WDS to keep in touch with family and friends; given that children, in many instances, need to leave their rural and regional communities to access better education services and to gain meaningful employment. While children and grandchildren would appear to be driving the use of Facebook by households in WDS, parents and grandparents are also embracing the use of Facebook to keep in touch with their children and grandchildren. Facebook is also used, to a lesser extent, by households to promote their businesses. Interestingly there is a smaller group within rural and regional households that tend to be older members of a household who will not use Facebook because they feel that it is not secure and/or is an invasion of their privacy.

Poster #19. C3 Commons: Communicate, collaborate, connect

Ms Shelley Grist (University of Southern Queensland)

C3 Commons is a prototype for a community focused social sharing research web application. Drawing on design patterns from social sharing, open source software and open contribution, the aim of this PhD design science research project is to provide a unique way for geographically dispersed researchers, businesses and government agencies to collectively communicate ideas and discuss topics relevant to all, to collaborate by sharing knowledge and resources, and to connect with others who have similar research interests.

C3 Commons provides an online space for members to work individually, in small groups, and as part of a larger community where shared contributions create a rich socially connected knowledge repository. Many social research and document sharing services already exist online. Research Gate allows scientists and researchers to share publications

and connect with peers; LinkedIn provides a professional network service; and blogging and cloud-based document sharing sites are numerous. However, all of these are separate, unconnected services. While each provides value in the social sharing it supports, they fail to leverage the higher value of social research sharing, which is in the richness of the multiple connections between members and their shared data. Member shared publications, resources, forums, blogs, and their associated metadata provide a rich source of socially connected data. This rich web of socially connected data can provide new ways to deploy data analysis to better facilitate information sharing, discovery and retrieval. Social network analysis of member contributions can also help members find other researchers who have knowledge of or interest in specific topic areas.

C3 Commons' primary benefit is its unique mix of community focused, social research sharing. By combining facilities for research support, knowledge sharing, communication and collaboration all in one service; C3 Commons offers a new form of connecting community-shared data that has not been available before.

Poster #20. Digital Internet connectivity strategy: Building a rural online community

Mr Tom Phillips (OneFarm, Centre of Excellence in Farm Business Management, New Zealand), Ms Linda Stewart (Massey University, New Zealand)

Aim: To create one Farm Business Management interactive digital community/central source of information for research, education, extension, rural professionals, farmers and industry from Lincoln and Massey Universities in New Zealand.

Digital strategy:

1. Real time engagement with current OneFarm Farm Business Management research;
2. Open Access and regular new website content. Profiling our Scholars and Scholarships;
3. Multiple media delivery of Research Reports including webinars, downloads and Apps;
4. Interactive aim to engage in two way conversation both inside <http://www.onefarm.ac.nz> and outside using Social Media (Twitter);
5. Use Twitter to build online community;
6. Develop connectivity strategy expecting future Internet broadband access and improved download speeds; and
7. Work with and engage Postgraduate and University Degree students in website design, webinars, blogs and Social Media including Facebook and Twitter.

Success:

1. www.onefarm.ac.nz was successfully designed and built with Massey University Design students' input;
2. The OneFarm website is capable of creating a Farm Business Management online community delivering regular research outcomes through different mediums

including webinars. The website, Mediasite presentations of webinars and the Apps are compatible with mobile devices;

3. Team Twitter use has been highly successful in attracting, engaging, alerting and informing our online community; and
4. Two Agricultural Degree student blogs have attracted 60,000 hits, bringing a different international audience. A Postgraduate writes an Agri-Tech Review blog. All students successfully use Twitter and Facebook to promote their blogs. Postgraduate students successfully present their research on webinars.

Not so successful:

1. Our ability to create two ways conversation on the website....partly a design issue; and
2. Difficult to get rural professionals and academic research staff to use Social Media.

Poster #21. Queensland primary pre-service teachers' self-efficacy to teach technology by the use of remote access laboratories

Ms Ting WU (University of Southern Queensland), Dr Warren Midgley (University of Southern Queensland), Professor Peter Albion (University of Southern Queensland), Dr Lindy Orwin (University of Southern Queensland)

This research is about Queensland primary pre-service teachers' self-efficacy to teach the technology curriculum. Remote Access Laboratories (RAL) are being used as a mediator to influence primary pre-service teachers' self-efficacy to teach technology. The main research question is to investigate in what ways engagement with Remote Access Labs influences primary pre-service teachers' self-efficacy. The sub question is what type of professional learning facilitates pre-service teachers' application of RAL in teaching practice. Bandura's self-efficacy theory is the conceptual framework used in this research. Based on Bandura's theory, the Science Teaching Efficacy Belief Instrument (STEBI) was developed. This research modifies the STEBI-B instrument for the measurement of pre-service teachers' self-efficacy to teach technology. Interviews will also be used to collect data. Participants are USQ's pre-service teachers who are studying a technology curriculum course. The STEBI-B survey and interviews will be conducted in three iterations, which are at the beginning, middle and end of Semester 1. From the surveys, this research will trace changes in their self-efficacy to investigate in what ways engagement with RAL influence their self-efficacy. Interviews will be used to ask why their self-efficacy changed and how to provide a professional learning program to facilitate their teaching using RAL in primary schools. The outcome of this research is to find out the pedagogical application of RAL in primary schools and teacher professional learning needs of using RAL to teach Technology in primary schools.

Poster #22. Academic associations: Networks in Australasian tertiary education

Professor Mike Keppell (University of Southern Queensland), Mr Gordon Suddaby (Consultant), Ms Natasha Hard (University of Southern Queensland)

The Network of Australasian Tertiary Associations (NATA) highlights the possibilities now available for collaboration and connection in the digital world. The NATA was a 2-year project funded by the Australian Learning and Teaching Council (ALTC) to bring together organisations with a common focus on supporting good practice in learning and teaching. As a network of networks, or 'supranet', the NATA included a range of dispersed stakeholders from across Australasia. This context necessitated a project management approach reliant upon a range of virtual tools and techniques.

NATA's partners included the Australasian Council on Open, Distance and E-Learning (ACODE) and Australasian Society for Computers in Learning in Tertiary Education (ascilite) as lead organisations; Council of Australian Directors of Academic Development (CADAD) Higher Education Research and Development Society of Australasia (HERDSA) and Open and Distance Learning Association of Australia (ODLAA) as partner organisations and Australia's Academic and Research Network (AARNet), NetSpot and the Office of Learning and Teaching (OLT) as enabling partners.

With a focus on networking and network leadership, the NATA developed a collection of practical resources and principles designed to improve the functioning of academic associations and ultimately support member engagement. It was predicted that improving the operations of these associations would support collaboration, collegial connections and the dissemination of good practice between educators from across the sector. Using this case study of academic associations in Australasia, the experiences of the NATA and the resources it has developed highlight some of the challenges and affordances of networks in the digital world.

Poster #23. A virtual ecological pond for applications in science education

Mr Wernhuar Tarng (Graduate Institute of e-Learning Technology, Taiwan), Yi-Syuan Shih (Graduate Institute of e-Learning Technology, Taiwan)

In the K-12 science and technology curriculum, there are many topics relative to aquatic ecology. The main objective is learning about the features of various aquatic habitats as well as observing the unique structures and functions of aquatic plants and animals to understand their relation to the ecological habitats. To enhance the problem-solving skills of students in scientific observation and motivation of exploration, teachers often combine teaching materials in textbooks with observational activities using ecological ponds. In addition, students can also become familiar with the factors affecting the growth of aquatic organisms by planting aquatic plants and rearing aquatic animals. These teaching activities can provide the basic knowledge for learning more advanced courses, such as biological diversity and environmental protection, in their future studies.

This study combined the VR technology and sensor functions on mobile devices, including the touch screen, electronic compass, and 3-axis accelerometers to develop a virtual campus ecological pond for educational applications. It incorporates real ecological

situations of aquatic habitats into learning activities to improve the learning interest and motivation of students. They can use the touch screen and motion-sensing control to observe the features of aquatic plants and animals, and become familiar with the relation of ecological balance and food chain through role playing and game missions. Students can see many kinds of aquatic plants and animals to discover their features, and play different roles to understand the relationship between producers and consumers. The virtual ecological pond can save the cost and manpower needed for building and maintaining a real ecological pond, and it can also solve the problems of insufficient species and difficulty of observing under water. Therefore, it is a useful assistant tool for teaching aquatic ecology in elementary and high schools.

Tours

All tours will depart from the front of the Japanese Gardens between 8:45am and 9:00am on Friday 27th of June. Please note that you need to have registered and paid by lunchtime on Thursday 26th of June to participate in a tour. Please contact the Conference Registration desk prior to this time if you wish to register or make any changes to your tour booking.

Mount Kent Observatory Tour

Officially opened in July 1996 as part of the Photoelectric Photometry 5 conference, the Mt Kent Observatory now operates as a robotic and remote-access facility for astronomical reduction, research training and outreach.



Join this tour to visit the observatory and see the telescopes first hand. Learn how they are used for research and training as well as how they support the “Shared Skies Partnership” between USQ and the University of Louisville in Kentucky, USA.

The scientific focus of the observatory is to support research into stellar astronomy and planetary systems. Using the telescopes on site, the scientific work done at Mt Kent aims to advance understanding of how a star’s activity can affect its orbiting planetary systems. The research project currently underway is called “Space Weather in Planetary Systems”.

Tour leader, Associate Professor Brad Carter, teaches and conducts research in physics and astronomy at the University of Southern Queensland. His current research focus is on stellar astronomy and planetary systems, and he is working on the use of robotic and remote-access telescopes to support the education and research training of distance education students.

Smart Farms Tour



The farming system of the future will have robotic sensing systems and decision support that interface seamlessly with commercial on-farm operations to optimise resource usage. The National Centre for Engineering in Agriculture (NCEA) is working on components of this.

The NCEA is a Research Centre of the University of Southern Queensland established in 1994. The Centre specialises in undertaking engineering research relevant to the agribusiness sector and the natural resource base it utilises. The NCEA develops solutions for a sustainable and profitable rural sector through applied engineering research, training and commercialisation.

On this tour, a range of technologies will be demonstrated at USQ's agricultural plot. The agricultural plot is an area within the University with an equipped bore, dam and irrigation system providing facilities for education and research of irrigation, mechatronic farming components and cropping.

Technologies to be demonstrated as part of the Smart Farm Tour include:

- Real-time interaction with on-farm data provided by mobile augmented reality;
- Smart weed spot sprayers, Unmanned Aerial Vehicles (UAVs) and irrigation machines; and
- A remote guided tour of an irrigated farm instrumented with on-farm sensors.

Tour leader, Steven Rees, is a Senior Research Engineer (Electronics) with over 20 years' experience in mechatronic research and development in the Australian agricultural sector. Steven's role at the NCEA provides electronic and practical application expertise to projects where required.

Wellcamp Airport Tour

Brisbane West Wellcamp Airport is currently under construction and will be operational by the end of 2014. Hailed as a game changer for the Toowoomba region, this jet capable public airport will be available for regular



passenger services, charter flights, fly-in-fly-out services and airfreight. The airport is designed to cater for large jets, up to 747 in size, allowing for even the largest of airfreight direct into the region.

This is particularly important, as Toowoomba is the second largest agricultural region in Australia. The airport will provide direct agricultural export opportunities for numerous markets including fresh fruit and vegetables, chilled beef, flowers and live equine movement to potential destinations such as New Zealand and parts of Asia.



The tour will showcase the terminal and sealed runway currently under construction at the Wellcamp Airport. You will see the two quarries where all material for the airport has been sourced and pass through the future Wellcamp Business Park.

Tour leader, John Wagner, is the Chairman of Wagner Global Services and one of the founders of the Wagner Group of Companies (Wagners). Wagners is a diversified group of companies based in Toowoomba comprising cement, flyash and lime production, contract crushing, on site concrete supply, bulk haulage, reinforcing steel, precast concrete, composite fibre products and an oil and gas engineering services business.

Key Supporters

Profile Pages

The Department of Science, Information Technology, Innovation and the Arts

The Department of Science, Information Technology, Innovation and the Arts enables a creative, connected and clever Queensland and supports the strategic objectives of the Queensland Government.

We develop and coordinate Queensland Government science and ICT policies, invest in research and development to meet the state's future challenges and encourage innovative solutions to enhance productivity.

Recently we announced the delivery of GoDigitalQld— Queensland's Digital Economy and Action Plan. GoDigitalQld is the state's roadmap to using digital technologies to support government, enhance business and improve lives.

This strategy and action plan is part of the Queensland Government's vision to become Australia's most digitally interactive state and globally recognised as a digital innovation hub. The actions detailed in GoDigitalQld have been developed to produce strong, prosperous and resilient regional Queensland economies. Importantly, it complements *The Queensland Plan* vision to pursue future opportunities through innovation and digital technologies.

We are proud to be a host partner at the Digital Rural Futures Conference 2014.

Great state. Great opportunity.





Queensland Government

Department of Agriculture, Fisheries and Forestry

The Department of Agriculture, Fisheries and Forestry enables Queensland to have efficient, innovative, resilient and profitable agriculture, fisheries and forestry sectors that thrive for the long-term.

Our work includes provision of agricultural research, development and extension, and the management of biosecurity, animal welfare and product integrity risks.

With the value of farm gate production and processing forecast at \$14.8 billion for 2013-14, Queensland is one of the nation's leading states for agriculture production.

We have many advantages – Queensland has a strong economy, a clean environment and we are located close to the world's big growth markets of Asia.

The Queensland Government is committed to growing agriculture even further, by working proactively with the business community and government agencies to help international investors access information and connect to Queensland companies.

The government's 2040 vision is to double agriculture production based on four key pathways:

- securing and increasing resource availability
- driving productivity growth across the supply chain
- securing and increasing market access
- minimising the costs of production.

These pathways are the key foundations required for sustainable and ongoing growth of the sector in terms of increasing production and value. This strategy underpins the work delivered across our department.

Regional University Network (RUN)

Profile Pages



REGIONAL STRENGTH. NATIONAL SUCCESS.

The Regional Universities Network is a coalition of six universities: Federation University Australia, University of New England, Southern Cross University, University of the Sunshine Coast, University of Southern Queensland and CQ University.

RUN members deliver educational programs across regional Australia, the nation and internationally to more than 110,000 students each year, including more than 45,000 students studying externally.

Our members all have their headquarters in regional cities or towns and play a vital role in the development of their regional economies and communities.

RUN members work in collaboration to pursue three key objectives:

- To provide policy advice to government, particularly with regard to tertiary education and regional development.
- To strengthen and promote the contributions of regional universities to regional and national development.
- To build institutional capacity and sustainability through the sharing of best practice in educational delivery, training, research and organisational management, particularly with reference to regional contexts.

We train over 2,200 higher degree by research candidates each year and conduct world standard research that matters to regional communities.

We are leading the creation of regional knowledge hubs and technology parks, providing local access to infrastructure, technologies, research, knowledge and skills and stimulating start-up and growth of new businesses.

The RUN Chair is rotated between the Vice-Chancellors of the member universities and is currently Professor Peter Lee, Vice-Chancellor of Southern Cross University. Our Executive Director is Dr Caroline Perkins.



The University of Southern Queensland (USQ) is a young, dynamic university founded on a tradition of self-reliance and local initiative.

In less than 50 years, USQ has become a prominent teaching and research institution providing education worldwide from three regional locations – Springfield, Toowoomba and Fraser Coast.

The Toowoomba region founded USQ out of their passion to provide the best possible educational opportunities for local students. The vision and determination of our local communities has seen USQ grow and expand with a reputation as one of Australia's leading providers of on-campus and online programs in Australia and overseas.

Almost 27,000 students from across Australia and around the world choose to study at USQ in the areas of:

- Business and Commerce
- Creative Arts and Media
- Education
- Health and Community
- Engineering and Built Environment
- Humanities and Communication
- Law and Justice
- Sciences
- Information Technology

Research at USQ is dedicated to meeting the challenges faced by regional populations and economies. Our multi-disciplinary research teams focus their efforts in research related to agricultural production systems, supporting sustainable agricultural environments, developing strong digital futures and enabling resilient regional business and communities.

Collaboration is fundamental to how we research. USQ values its strong partnerships with industry, government, the community and a global network of esteemed research institutions.

USQ has a solid reputation for practical, applied research that utilise our core strengths in agriculture and natural resource management and emerging strengths in digital futures and building regional resilience.

For more about USQ visit usq.edu.au

Agriculture AT CQUniversity

PARTNERING WITH INDUSTRY TO DRIVE A MORE SUCCESSFUL FUTURE FOR AUSTRALIAN AGRICULTURE

POWER OF PLACE

With a physical presence across thriving regional hubs, vibrant coastal communities and metropolitan centres, CQUniversity stands alone as the only Australian university with a truly national footprint.

This expansive coverage means the University has a unique 'power of place', allowing researchers to work closely with primary producers in regions like Bundaberg (where a majority of Australia's fruit and vegetables are produced) and Rockhampton (Australia's beef capital).

PRACTICAL TEACHING AND PROGRAMS

Our programs reflect the needs of industry. Extension activities are delivered in settings such as our Central Queensland Innovation and Research Precinct (CQIRP), and through engagement activities with partners such as AgForce, Belmont Research Station.

Current programs include:

- Bachelor of Agribusiness and Food Security
- Bachelor of Science including major in Agricultural and Food Science
- Master of Applied Science
- Doctor of Philosophy (Sciences, Engineering and Health).

For more information, please visit
cqu.edu.au/study or phone 13 27 86.

RESEARCH

CQUniversity achieved a research ranking well above world standard in the 2012 Excellence in Research Australia (ERA), in the area of Agriculture and Vet Sciences, and was the only Australian university to achieve the same ranking in the field of Agriculture and Farm Management.

Research strengths include:

- agricultural management
- beef cattle production
- food production
- horticulture
- plant and water science
- resource economics.

Emerging themes in research include improvement of farm monitoring and innovation at the whole of farm level.



BE WHAT YOU WANT TO BE



Federation University Australia

A new name in education

An expanded, regional university with a reputation for relevance and excellence, Federation University Australia has a strong tradition of education and training delivery which spans more than 140 years via our predecessor institutions, the University of Ballarat and Monash University's Gippsland Campus.

FedUni embraces the freedom and dynamism that comes from being a progressive university with close links to industry, business, communities and technology. It is also recognised as a welcoming and friendly university for international students.

We place great emphasis on the quality of our teaching and learning, delivering a range of innovative programs in both Higher Education and vocational education and training. Embracing diversity, FedUni is Australia's only regional, multi-sector university and a pivotal provider of post-secondary education for regional Victoria.

Five campuses from the west of Victoria to the east, combined with the Nanya Environmental Research Station in Western New South Wales, anchor the range of programs that FedUni delivers throughout Australia and internationally.



Learn to succeed

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University of New England

www.une.edu.au

The University of New England undertakes fundamental and applied research in many disciplines. Its scholars and scientists have established international reputations through their contributions in areas including rural and environmental science, precision agriculture, agricultural economics, pure and applied mathematics, education and rural health, to name a few. Collaborative research with other institutions, such as the CSIRO, state Departments of Primary Industries, and our significant leadership role in numerous Cooperative Research Centres highlights our role in, and commitment to, tackling complex problems in rural and regional Australia. Our research involves extensive engagement in large-scale interdisciplinary collaborations within UNE, nationally and internationally, and is underpinned by five thematic research priorities:

- Australia's future food and water security including smart science and smart technology, and our world-leading SMART farm;
- Climate change and environmental sustainability, protecting biodiversity and effective policies;
- Health and wellbeing in rural communities focussing on social exclusion, health inequity, mental health and social policy;
- Our past, present and future including Australia's regional history, regional memory, regional identity, the protection and promotion of cultural heritage; and
- Our communities, our neighbours, regional and rural development, sustainability, prosperity and peace.

Our collaborative research networks are composed of expertise drawn from relevant core research disciplines within our eleven Schools and it is through our research activities that the University is able to assist in the economic, social and cultural advancement of Australia and in the advanced training of undergraduate and postgraduate students.





The University of the Sunshine Coast (USC) is situated within one of Australia's fastest growing regions, approximately 100k north of Brisbane. It is Australia's newest university but it is rapidly growing and recognised for its very high ratings for teaching and learning and graduate satisfaction. USC has recently reached the milestone of 10,000 students, based principally at its Sippy Downs campus, but with outreach facilities at Gympie, Noosa and North Lakes.

It has two Faculties – Faculty of Science, Health Education and Engineering (FOSHEE) and Faculty of Arts and Business (FAB) and, over recent years has had major successes in the establishment of engineering and law. It has a rapidly increasing research precinct, particularly in genomics, health science and sustainability and health science. Critically important to the University is the construction nearby of the \$1.8b Sunshine Coast University Hospital and, incorporated in that a Skills and Academic Research Centre, of which USC is a major participant.

USC is absolutely committed to its home region but also sees its future in wider spheres of influence based particularly on its research agenda and support for the northern growth corridor of Brisbane, from which it already draws a large proportion of its student base. It has a very active and targeted international agenda and hosts over 1000 international students.

USC practices what it preaches and with a campus that is now an exemplar of sustainability and contemporary design, and an award winning innovation centre which provides an interface between the University and the business community. USC is firmly committed to engagement through partnerships with key stakeholders in government (particularly its regional council) business and the wider community.

For more information about USC visit usc.edu.au

Southern Cross University (SCU) aims to create research that has global and regional impact and relevance. The University's research is focused on creating knowledge in our areas of research strength including environmental sciences, plant sciences, geoscience, forestry, gambling research, marine science, business, education and tourism. SCU is committed to building strategic collaborations with other universities and organisations, including regionally-based stakeholders.

Regional Futures at SCU

The Southern Cross Business School undertakes research in the area of regional development including Indigenous entrepreneurship. Research projects include regional development including Indigenous entrepreneurship; examining the processes for ensuring effective regional development; ways to improve beef production in northern NSW; the barriers to Indigenous business development in the Bundjalung Nation, NSW; and, the utilisation of user generated content by regional small and medium-sized businesses.

For further information see scu.edu.au/business-school/index.php/60

Regional Initiative for Social Innovation and Research (RISIR)

A key focus of RISIR's research to date has been the identification of strategies that enhance the resilience of regional and rural communities. Of particular research interest has been the capacity of digital technology to provide a new platform for engagement within a number of different communities. RISIR has partnered with local government, state and federal government departments, other research entities, community organisations and business.

For further information see works.bepress.com/rick_van_der_zwan/

Digital Futures for Health Care at SCU

SCU is currently working with Feros Care, a large aged care provider on the east coast of Australia, to evaluate a National Broadband Network enabled pilot called My Health Clinic at Home (MHCAH).

My Health Clinic At Home (MHCAH) pilot program is designed to showcase the use and demonstrate the benefits of how the National Broadband Network (NBN) and Telehealth can offer a complementary virtual health service model for those seniors who need it, when they need it and where they need it.

Through the MHCAH pilot, Feros Care has provided a virtual case management model for nearly 200 seniors who require greater support, due to their chronic conditions, social isolation and/or remoteness to adequate health support services. The evaluation is exploring the extent to which NBN enabled Telehealth technologies can keep seniors linked and connected remotely to their health professionals, community support, families and friends, with home-based daily monitoring of their condition and wellbeing.

For more information see: scu.edu.au/staffdirectory/person_detail.php?person=18357 or www.feroscare.com.au/

University of Southern Queensland (USQ) Supporters

Profile Pages



The Australian Digital Futures Institute (ADFI) is an innovation and research Institute which aims to explore and influence digital literacies through innovation, research and collaboration for positive social change.

ADFI has a vision to transform the knowledge and skills of society through digital literacies that will enable individuals to work, live, play and interact more effectively in a digital age.

There is an increasingly wide range of information, media, business services and entertainment that require digital literacies. Specific aspects of digital literacies include: personalised learning, mobility, digital communities and spaces.

A key aspect of research at USQ is multi-disciplinary research between the Institutes and across the University. The area of digital futures is a priority research area for USQ that ADFI leads across the University.

Through a partnership with the University of Southern Queensland, Australian National University and the University of South Australia, ADFI leads the Digital Futures (Collaborative Research Network) program which includes over 90 researchers across the three universities. This project is supported through the Australian Government's Collaborative Research Networks (CRN) program and explores the future in a digital age.

ADFI advocate that digital literacies are a necessity for life in the digital age. A fundamental component of achieving excellence is focus; ADFI will focus its research efforts on digital identity, digital inclusion, digital economy and digital society.

Our research focus is aligned with the University of Southern Queensland's research strategy of building research capacity, culture change and fostering research partnerships for the future.

ADFI's Major projects

Digital Futures (Collaborative Research Network)

HEPPP: Making the connection: Improving Access to Higher Education for Low Socio-Economic Status Students with ICT Limitations

Regional Universities (RUN) Maths and Science Digital Classroom

Effectiveness of interventions in the context of Aged Care and Community Education and Research Training (ACCERT)

OLT: From access to success: improving the higher education learning experience for students without internet access

Network of Australasian Tertiary Associations (NATA)



NCEA

National Centre for
Engineering in Agriculture

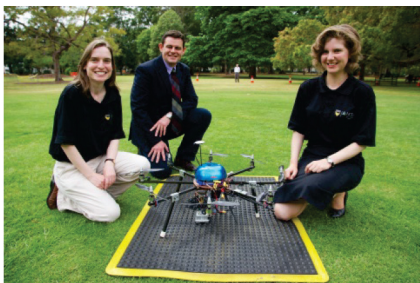
The National Centre for Engineering in Agriculture (NCEA) has been a leader of innovation in Australian Agriculture for more than 20 years. The NCEA is recognised as a Centre of Excellence within the University of Southern Queensland (USQ) and is aligned with the Institute for Agriculture and the Environment (IAgE) which is home to USQ's world-class research groups.

Established in 1994, the NCEA specialises in developing solutions for a sustainable and profitable rural sector, through applied engineering research, training and commercialisation. From modest beginnings the NCEA has grown to 80 personnel, including industry based researchers and post graduate research students

The NCEA has concentrated on growing it's capabilities in irrigation and water resources, soils and environmental science and energy efficiency while initiating the development of precision farming systems and new technologies to improve cropping and animal production.

Key research themes include:

- Irrigation and Water Management
- Sustainable Soils and Landscapes
- Precision Agriculture
- Energy Conservation Management
- Automation, Robotics and Machine Vision





Institute for Resilient Regions

A Systems Approach for Research

The Institute undertakes research in three key themes of Learning and Development, Business and Enterprise and Health and Wellbeing.

Resilient Regions Research



A Systems Approach for Research on Resilient Regions

As a key part of USQ's strategic research development, the Institute for Resilient Regions (IRR) is leading and delivering applied social sciences and humanities research into innovation for building regional resilience and thriving communities in non-metropolitan Australia.

IRR complements USQ's other strategic research Institutes: The Institute for Agriculture and Environment and the Australian Digital Futures Institute. IRR's research is

focused on life in regional Australia, helping communities build their social capital and well-being through innovation in community learning, business and enterprise, and health and welfare services.

A team of more than 40 members of USQ's academic staff are involved in the Resilient Regions research program and they work in close collaboration with other research organisations, government agencies, as well as business and community groups.

Contacts at the Institute for Resilient Regions:

Executive Director, Professor John Cole
John.Cole@usq.edu.au

Manager Strategic Development, Ms Alison Curtis
Alison.Curtis@usq.edu.au

Leading Innovation in Agriculture

A revolution in sensing, automation and control systems is driving the future of farming.

On the ground and in the air, smart systems and technologies are transforming agriculture; increasing yields, delivering efficiencies, saving water and reducing environmental impacts.

Food production will need to double in order to feed a global population of nine billion people in 2050.

The University of Southern Queensland's Institute for Agriculture and the Environment is home to world-class research groups in climate science,

crop biotechnology, irrigated agriculture and engineering in agriculture. These groups are developing technologies and systems to meet the challenges of feeding and clothing the world's growing population.

At USQ we are committed to delivering innovative, practical, and profitable research solutions that improve agricultural productivity and resource management.



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Parking

Where to park:

The recommended parking areas for the conference are in parking areas 10 and 4.

Restricted parking:

There are a number of restricted car parks. These have a diagonal red line through the parking space – Do not park in these areas.

Metered Bays:

Metered parking can be found in the following restricted parking areas:

- Car parking 3, adjacent to Y Block
- Car parking 3a, adjacent to S Block
- Car park 9, W Block
- Car park 12, Clive Berghofer Recreation Centre

A parking ticket, which can be purchased at the automatic ticket dispensing machine located within the respective car park area, must be displayed on vehicles parked in a metered car parking area.

Disabled parking:

Disabled driver's vehicles parked in bays reserved for persons with disabilities must display an Australian Disability Parking Permit (ADPP). Under exceptional circumstances, visitors, staff and students may be issued with special Temporary Parking Permits. Application for such Permits may be made at [Student Services](#) or at the [Parking/Security Office](#).

All vehicles parked on the site of the University do so at the owner's risk.

Venue Map

Conference Rooms:

RUN Room (H102), Toowoomba Regional Council Room (R113), NCEA Room (L206), DAFF Q Room (L209), DSITIA Room (C204), ADFI Room (S108).



Campus Information: <http://www.usq.edu.au/digital-rural-futures/location>

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