



2017 Annual Conference

TRANSFORMING LIVES AND LIVELIHOODS: The Digital Revolution in Agriculture

Scholar Reflections



THE CRAWFORD FUND
For a Food Secure World



TABLE OF CONTENTS

Australian Capital Territory (ACT) Committee	Page 4
Kathy Dibley, <i>CSIRO Agriculture & Food</i>	Page 4
Kylie Ireland, <i>CSIRO</i>	Page 4
Raghvendra Sharma, <i>CSIRO Agriculture & Food</i>	Page 5
New South Wales (NSW) Committee	Page 6
Bhakti Haldankar, <i>The University of Sydney</i>	Page 6
Sam Coggins, <i>The University of Sydney</i>	Page 7
Samuel Ariong, <i>The University of Newcastle</i>	Page 8
Northern Territory (NT) Committee	Page 8
Maddison Clonan, <i>Charles Sturt University</i>	Page 8
Kimberley Hunnam, <i>Charles Darwin University</i>	Page 10
Queensland (QLD) Committee	Page 10
Fynn De Daunton, <i>University of Queensland</i>	Page 10
Sarah Sutcliffe, <i>James Cook University</i>	Page 11
John Fasi, <i>University of Queensland</i>	Page 12
Lydia O'Meara, <i>Central Queensland University</i>	Page 13
South Australian (SA) Committee	Page 13
Chandnee Ramkissoon, <i>The University of Adelaide</i>	Page 13
Yanchen Zhang, <i>The University of Adelaide</i>	Page 14
Tasmanian (TAS) Committee	Page 15
Sohail Ayyaz, <i>Tasmanian Institute of Agriculture, University of Tasmania</i>	Page 15
Oliver Gales, <i>University of Tasmania</i>	Page 16
Kristy Stevenson, <i>University of Tasmania</i>	Page 17
Victorian (VIC) Committee	Page 17
Melanie Addinsall, <i>Agriculture Victoria</i>	Page 17
Sophie Lamond, <i>University of Melbourne</i>	Page 18
Helena Smith, <i>Agriculture Victoria</i>	Page 19
Natasha Brohier, <i>La Trobe University</i>	Page 20
West Australian (WA) Committee	Page 21
Xin (Bob) Du, <i>Murdoch University</i>	Page 21
Sarah Hyde, <i>Facey Group Inc.</i>	Page 22
Ana Manero Ruiz, <i>Australian National University</i>	Page 22
Australian Agricultural and Resource Economics Society (AARES) QLD	Page 23
Alisher Ergashev, <i>Queensland Department of Agriculture and Fisheries</i>	Page 23



Australian Animal Health Laboratories (AAHL), CSIRO	Page 24
Linjun Jing, <i>The University of Melbourne</i>	Page 24
Joseph Macharia, <i>Queensland University of Technology</i>	Page 24
Salman Sarwar, <i>The University of Queensland</i>	Page 25
Central Queensland University (CQU)	Page 26
Kirt Hainzer, <i>Central Queensland University</i>	Page 26
Julie-Ann Malan, <i>Central Queensland University</i>	Page 26
Paramullage (Upamali) Sandaruwan Peiris, <i>Central Queensland University</i>	Page 27
Deakin University	Page 28
David Giles, <i>Deakin University</i>	Page 28
Victoria Stead, <i>Deakin University</i>	Page 29
Elanco Animal Health	Page 30
Elsa Glanville, <i>Mackinnon Project, University of Melbourne</i>	Page 30
Natalie Hoskins, <i>Western Sydney University</i>	Page 31
Fifth Estate	Page 32
Timothy Mort, <i>Fifth Estate</i>	Page 32
Graham Centre for Agricultural Innovation, Charles Sturt University	Page 33
Arundhita Bhanjdeo, <i>Graham Centre for Agricultural Innovation, Charles Sturt University</i>	Page 33
Cara Wilson, <i>Graham Centre for Agricultural Innovation, Charles Sturt University</i>	Page 33
Marcus Oldham	Page 34
James Hawkins, <i>Marcus Oldham</i>	Page 34
Jennifer Scott, <i>Marcus Oldham</i>	Page 35
Tasmanian Institute of Agriculture, University of Tasmania	Page 36
Tahseen Zeb, <i>Tasmanian Institute of Agriculture, University of Tasmania</i>	Page 36
The Gardiner Foundation	Page 36
Molly Voss, <i>The University of Melbourne</i>	Page 36
Ruchika Perera, <i>The University of Melbourne</i>	Page 37
University of Melbourne	Page 38
Cecilia Cameron, <i>The University of Melbourne</i>	Page 38
University of New England	Page 39
Thi Hiep Dao, <i>University of New England</i>	Page 39
Zelalem L. Moti, <i>University of New England</i>	Page 40
University of the Sunshine Coast	Page 41
Hgoc Hoan Le, <i>University of the Sunshine Coast</i>	Page 41
Flavia Sarti Bonora, <i>University of the Sunshine Coast</i>	Page 42



AUSTRALIAN CAPITAL TERRITORY (ACT) COMMITTEE

Kathy Dibley, *CSIRO Agriculture & Food*

I am most fortunate to have been an ACT Crawford Scholar for this year's conference, and to network with many other young and more experienced scientists working in international agricultural development. With the theme of "The Digital Revolution in Agriculture - Transforming Lives and Livelihoods," the enormous potential for the digital agriculture data revolution to increase overall productivity and profitability of smallholder farms in the developing world was examined, through both case studies and panel discussion.

In the opening session, the significance of smallholder farms in global food production was established, with the majority of world food production being produced from smallholdings. The barriers of smallholder farmers to useful data to manage their holdings were also explored. It seems there is still much capacity to increase the proportion of agricultural data digitised, relative to other sectors. Agricultural data that is collected, particularly in developing nations, tends to be fragmented, non-standardised, and inaccessible to those who need it to make critical decisions that will have a great impact on smallholding productivity and profitability (for instance, current and forecasted market prices at harvest). In later sessions, we saw innovations that had been developed, including the platform Digital Farmhand, which uses on-farm robotics to collect in-crop data via sensors, and the use of 3D barcodes to trace produce from point of harvest in rural Vietnam, through quality certification and to point of sale in urban areas. A case study in the application of "big data" that was of particular interest to me as a researcher in crop pre-breeding (and immediately applicable to my current project) was the use of climatic and other data for focused germplasm identification in breeding efforts.

I noticed several recurring themes that surfaced throughout the conference. The first of these was of crop nutritional quality. It became clear through the talks and panel discussions that it is not sufficient to consider smallholder output purely in quantitative terms such as crop yields. It is equally important that harvests from smallholdings must either meet the nutritional demands of the farmers and their families, or provide sufficient profit margins to provide the purchasing power to enable them to meet these needs. A second theme that was discussed at length over the course of the conference was around data ownership, and the merits and limitations of both private and public/open source data. The third theme centred round mobile phone technologies, and their use as a form of infrastructure to deliver data to smallholders in a timely way. It is apparent that the use of apps has moved well beyond being just a trend, as the case study on the use of mobile technology as a tool for helping smallholder pastoralists make more informed decisions about drought risk and accessing livestock insurance in rural Kenya.

The one-day conference was bookended with two days of scholar day activities, which provided an excellent orientation to the work of the Crawford Fund, ACIAR, RAID and the community of international agricultural development researchers in Australia. For me personally, the most valuable part of the three days of activities were the discussions, introductions and insights into international agricultural development gained through interactions with my mentor. I also found the reflections and advice of scientists on their in-country experiences on past and current ACIAR projects to be of particular practical use, and an excellent session to ground scholars in the real-world potential and challenges in adopting new technologies (including digital ones) in developing world agricultural settings.

Thank you to the Crawford Fund, its supporters, the speakers and mentors for enabling my involvement in this year's conference - it has been an invaluable opportunity to learn, network and motivate myself to contribute in this field.

Kylie Ireland, *CSIRO*

We live in an incredible age of transformation at both the digital and human interfaces of society. The power of this change, and how we can harness the knowledge available to us to deliver agriculturally-driven and scientifically/evidence-based benefits to those most at need, was abundantly apparent at this year's annual Crawford Fund Conference.



From the moment public proceedings began, with the Sir John Crawford Memorial Address “A New Narrative Ending Hunger”, delivered by Dr Lindiwe Majele Sibanda, the atmosphere was electric. It is rare at times to hear such an incredible and inspiring oration, which gently winds you through the comfort of a great story to the heart of an issue – it’s time for nutritionally sensitive agriculture. We were perhaps ignorant historically in our pursuit of quantity over quality, but we know better now and we surely have the capacity and the responsibility to change the face of agriculture to provide a foundation for the solution. It’s time for institutions to engage effectively with one another – across jurisdictional and spatial boundaries – to deliver on a promise of a healthier, happier, and more inclusive world with equitable access to nutritious and fulfilling food choices.

The inspiration continued during the next day during formal conference proceedings, with sessions tackling issues of how big and small data can transform agriculture for the smallholder farmer, some of the key issues encountered when doing so, and how digital transformation and technologies are changing the face of agriculture in general.

Some key thought gems I found inspiring:

- “More people have access to a mobile phone than a toilet” – Dr Andy Jarvis

#Game changer – for data collection and information dissemination

- Encouraging access to sensible, useful and open data to share knowledge and drive innovation. This will require: institutional reform, new partnerships and an enabling environment – a sentiment heralded by multiple presenters on the day.

Having experienced this in my own work, I would like to echo my support of this sentiment - sharing data has the capacity and capability to transform agriculture and other scientific disciplines in ways we cannot even begin to imagine

- “You can’t text a tomato”

Infrastructure is key to true market access. The success of agriculture is the sum of all of its parts.

- “You can’t manage what you can’t measure” – Dr Colin Chartres

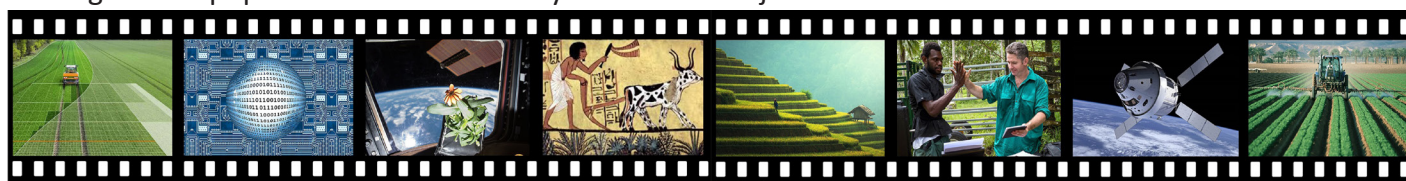
Digital agriculture platforms offer so much in this space – the possibilities are endless...

Bookending these incredible and inspiring proceedings was an equally incredible and inspiring Scholars’ Program. Each paired with a mentor with a wealth of experience in international agricultural development, with ample networking opportunities and informal and formal presentations of the possibilities and the pitfalls of working in the international agriculture space, I believe every single scholar had as fantastic a time as I did. With this new network and community of international agricultural development colleagues and mentors I look forward to forging ahead and contributing to international agricultural development in my future career – the challenges are great, but they are worthy, and if we put “farmers first” we can truly make a lasting difference together.

Raghvendra Sharma, CSIRO Agriculture & Food

First of all, I would like to thank the Crawford Fund for providing this great opportunity to participate in the conference focused on “Transforming Lives and Livelihoods: The Digital Revolution in Agriculture.” The experience and knowledge, gained from this event has given me the encouragement and confidence to work towards world food security. By attending this conference, I had the opportunity to meet world-renowned scientists in the field of agriculture.

I was very impressed with the many innovative presentations during the conference on the uses of new and digital technologies to increase global food production to meet the food demand for the rising human population. The seminar by Dr Lindiwe Majele Sibanda on international networks and



opportunities and the Sir John Crawford Memorial Address followed by Prof Andrew Campbell's talk was very impressive and motivating. Meeting with mentor, Dr Anthony Leddin was a great experience, and I am very much impressed by his valuable contribution to food security. His view and efforts to help farmers further stimulated a similar interest inside me. Meeting with other agriculture scientists, RAIDers, volunteers and ACIAR in the pearl of wisdom session was another excellent opportunity to discuss the future possibilities in the agriculture field. It gave me an opportunity to know about others' work and their future ambitions and also, I got the chance to discuss my work and plans for the future. Suggestions from the mentors further encouraged my wish to carry out research in the field of agriculture for food security. The first day RAID networking dinner was a great avenue for scholar's interactions with scientists, and leaders in the agriculture field.

The second-day parliamentary conference enriched me with many fantastic presentations such as "Big Data for Genebank Mining" by Dr Ken Street which was fantastic and I was inspired as my work is also on exploring the sources of seedling stripe rust disease resistance genes from the landraces collected by Vavilov.

I heard that the availability of data for the public will enable them to work efficiently without any barrier, and while lots of people in developing countries have talent, due to lack of resources and funds, they are unable to access the data available for research. Availability of data will solve the problem and progress their work to secure the production. Another seminar (case study) on "Digital Farmhand – data analytics and robotics for food and nutrition security" by Prof Salah Sukkarieh was also interesting for me. Participation in the career sessions on the last day encouraged me to participate in the programs related to agriculture and it highlighted the opportunities available.

In summary, innovative and informative talks and networking sessions on food security issues made the conference fruitful.

NEW SOUTH WALES (NSW) COMMITTEE

Bhakti Haldankar, *The University of Sydney*

The Crawford Fund conference has already gone up in my list of "Highlights of the Year – 2017". The experience was very raw and amazing. There are several reasons contributing to it. One of which was the topic of discussion at the conference. Digital agriculture is an extremely active field with endless potential presently. It also happens to be the one in which I want to work in. The conference was good because not only did it present what is being done in the digital field of agriculture but also emphasised the reasons why there is need to embrace it. This was accompanied by excellent presentations by industry leaders in the field. The information presented was excellent, some of which I did not know of. Some of them highlighted the new innovations developed in the industry and its potential and applications whilst others highlighted issues that are present in the industry with a focus on small-holder farmers.

Some presentations that really caught my interest were the GODAN presentation by André Laperrière and CGIAR presentation by Andy Jarvis. André's presentation was interesting because he talked about open data and how GODAN is working on it. It is a very important issue, especially for someone like me who is a budding scientist in the data world of agriculture. Additionally, just the case studies of the digital media use in predominantly small-holder countries like Ghana and Ethiopia was refreshing.

Andy's presentation was as interesting as it gave some current facts about the technological adoption however, they were surprising. For instance, agricultural ranks last in the USA in terms of digitisation. I anticipated agriculture would not rank first but was not expecting it be last either. Some of the constraints that he mentioned that are very critical is the inherent complexity found in agricultural data. This also leads to noisy datasets which is another issue.

One of the important things that need to happen in the industry as mentioned by Andy is increased public extension. Where the farmers need to see the opportunities and benefits of the various products



that are developed or being developed. For which human interface is important.

Now getting to student experience, I personally found the Conference both intellectually and socially enriching. The several networking opportunities we received over the three days were incredibly useful. The delegates present at the Conference were very approachable and helpful. The repeated networking events also gave us the opportunity to think about our conversations with the delegates and follow-up with queries at the next event. At a personal level, I found the networking events combined both social and intellectual aspects, as I had very interesting and inspirational conversations with some of the delegates. Most importantly, the conference and the networking events exposed me to different ideas. Ideas on what road can be carved after I pass my current stage. Something else I noticed, that there were a few presentations that were only focused on issues with no input made to suggested solutions. While highlighting the issues is important, I thought as young scientists we are told to at least think about some solutions to a problem while presenting them.

But overall, I absolutely enjoyed the Conference. This was the first official Conference I attended and my patience yielded sweet fruits.

Sam Coggins, *The University of Sydney*

The 2017 Crawford Fund Conference encouraged me to value diverse agricultural systems, perspectives and skillsets. Valuing diverse agricultural systems was a feature of the conference. Dr Lindiwe shared a powerful personal story to convey the nutritional consequences of eliminating diversity from smallholder farming systems. Professor Mario Herrero continued the conversation when he presented his paper 'Farming and the geography of nutrient production for human use: a transdisciplinary analysis'. Using gigantic datasets, Professor Herrero demonstrated that diverse agricultural systems are "necessary to maintain the production of diverse nutrients and viable, multifunctional, sustainable landscapes" (Herrero et al., 2017). This not only provided valuable evidence for the importance of diversity but also for the potential of 'big data'. I am studying remote sensing at university this semester so it was inspiring to learn about such a meaningful application of it!

Valuing diverse perspectives was another feature of the conference. An area of contention was the debate surrounding open source data. Steve Mathews (Founder and CEO of Gro-Intelligence) argued that collecting and cleaning data is a demanding process that must be paid for in order to provide the service sustainably. Dr Ken Street disagreed and stressed that private sector enterprises may manipulate datasets to provide clients the statistical results that they are looking for. André Laperrière (in an informal conversation) added that open source data has been found to generally be more reliable. He explained that making data sets open to public criticism creates an incentive for rigorous data collection/cleaning. He cited Wikipedia as an example of publically available knowledge that is relatively reliable.

The conference encouraged us to embrace these diverse perspectives. The areas of contention were not only the most interesting but also the most thought provoking. This enabled me to realise the importance of engaging in debate beyond the science community. At the student day, John Anderson (Former Deputy Prime Minister of Australia) highlighted the importance of facilitating frank but respectful debates. He emphasised that good policy requires all stakeholders to be given a legitimate voice. He encouraged us to not only participate in these debates but also reflect on them with reason.

Valuing diverse skillsets was a third feature of the conference. At the student day, a recurring theme was becoming a well-rounded professional. In an informal conversation, Professor Lester Burgess convincingly articulated the power of combining 'hard' technical skills with 'soft' people skills. Another salient point was the importance of developing networks in order to tap into other people's knowledge and skillsets.

I took so much away from the 2017 Crawford Fund conference. It was an amazing opportunity to connect with experienced (and aspiring) international agricultural researchers. I got on the bus back to Sydney with so many new ideas to reflect on. Thank you to the Crawford Fund for the incredible opportunity – I am genuinely grateful for it.



Samuel Ariong, *The University of Newcastle*

I made a decision to apply to attend the Crawford Fund Conference 2017, with the theme “Transforming Lives and Livelihoods; The Digital Revolution in Agriculture”, Ideally the theme corresponded with my research area; poverty reduction, and food security in the Sub Sahara Africa. It was a critical decision to me because I was at the final phase of my PhD candidature, and my thesis was due for submission in weeks. However, this was a conference that anyone interested in agricultural development particularly in developing countries that are still entrenched in food and nutrition insecurity could not afford to ignore.

I would like to take note of the following key insights from the conference:

The Keynote address presented by Dr Lindiwe Majele Sibanda reflected the main theme of the conference “Transforming Lives and Livelihoods: The Digital Revolution in Agriculture”, outlined a new narrative on how to end global hunger. This presentation was quite momentous to me as it added a new dimension of food nutrition beyond food security which had been my pre-occupation both at theoretical and practical levels. It also highlighted the significant role played by women in food security and nutrition in developing countries, considering the fact that two thirds of smallholder agricultural labour force comes from women. And with smallholder agriculture being a dominant sector for socio-economic transformation, agricultural research and international development ought to explore new discourses that situate women, and girl children at the forefront.

Other presentations were significantly impacting too: Open data for Agricultural Nutrition: Big Data for the little guy— touched aspects of rising population, dramatic climatic changes, and technological advances. However, through meaningful partnerships with the farmers, science based approaches can make positive changes in the lives of millions, as well as on the environment we live; ICT adding value for smallholder farmers—highlighted levels through which digital agriculture can empower smallholder farmers. The intersection between water, energy and food and nutrition was promptly elaborated and connected to SDGs 1; and the Transformational Change Based on Innovation Platforms was equally very imperative. Digital service innovations are highly critical, taking an example of Uganda where farmers immensely provided prompt information on their phones about the impact of bacteria on their banana plantations.

Mentoring and networking was exemplary, highly enriching and rewarding— I shared a lot with my mentor, Peter McCawley, a distinguished economist, with a glowing career in international aid and development. We shared a lot and I learnt more from him and we are continuing to collaborate and share more. I also had opportunity to meet Professor Robyn Alders, whom I had read a lot of her work in Sub Sahara Africa, how her efforts were transforming and positively impacting on lives, particularly women. This was indeed inspiring. I met Professor Petra Tschakert, and particularly picked up interest on her work regarding climate changes and smallholder agriculture in West Africa. I had opportunity to talk to Professor Andrew Campbell, particularly ACIAR’s effort through Cultiv Africa project in Kenya and East Africa. I networked with number of scholars from the universities all over Australia, whom I hope to continue collaborating with in agricultural research and international development.

Finally, I would like to seize this opportunity to convey my thanks to NSW state committee for giving me a scholarship to attend this wonderful conference. I also would like to thank the organisers of the conference - it was indeed worthwhile.

NORTHERN TERRITORY (NT) COMMITTEE

Maddison Clonan, *Charles Sturt University*

I had a unique perspective going into the Crawford Fund Parliamentary Conference. Having not yet participated in international agricultural research in any capacity, I was keen to learn the ins and outs, opportunities and challenges and meet the leaders in this field. At its conclusion, I can confidently say I have gained a wealth of new knowledge about working, volunteering and studying in international agricultural research, and a newly formed passion for the goals and possibilities available in this area.



Beginning my conference experience by meeting the scholars sharing my unit the day before official events commenced, set up for a comfortable and collaborative conference experience. Already I am immersed in a group of people with common interests and varied professional and student experiences, and have begun building a network of highly rewarding and valuable relationships. Arriving at the first scholar day to share lunch with the extended scholar group expanded on these first experiences. The scholars, mentors and coordinators can be described as a vastly diverse group of intelligent, creative and inspiring people who are excited to share and collaborate with others.

To begin proceedings, Dr Lindiwe Majele Sibanda shared the development of her career and personal life in a stimulating opening to the conference proceedings, leaving the room provoked to thought and eager for the remainder of the day's events. This was followed by a personal and practical address from Professor Andrew Campbell, CEO of the Australian Centre for International Agricultural Research (ACIAR). Professor Campbell introduced key topics that would be followed up throughout the rest of the conference, with valuable career advice.

Age diversity in agriculture was touched on repeatedly, with the importance of bridging gaps in age to facilitate the most effective collaboration in agricultural research. Next Dr Kylie Ireland and Dr Pham Thi Sen introduced their work in Laos and Vietnam providing exposure to the challenges and rewards of volunteering or working in agricultural research from within developing countries. The essentiality of social research became a continuing theme in the success of international agricultural research. Next Richard Dickmann from Bayer and Jessica Ramsden from Elanco Animal Health introduced the world of private and commercial international agricultural investment, and the training and work opportunities that they offer. Monday finished with a discussion on the value of mentors, networks and the conference experience from Professor Lester Burgess and Professor Deirdre Lemerle from The Crawford Fund. Overall, it was an invaluable introduction to the scholar club, The Crawford Fund, private and public organisations, opportunities in international agriculture and the Crawford Parliamentary Conference, from a star studded line up.

I woke with excitement on Tuesday, for it was not only the day of official conference events in which delegates were attending, but also my first trip to Parliament House. On arrival we were immediately immersed in the formality of parliamentary procedure and the crowd of delegates attending the conference. Hundreds more friendly faces joined the conversation and filled tea breaks with introduction after introduction from a diverse range of fascinating jobs, interests, backgrounds and projects. The day's schedule covered many aspects of International Agricultural Research, most new to me, and most presented by a global leader in their field with experience and passion. Free access to global pools of data was a topic that I had not considered before this event, but it sparked my imagination as to the social, environmental and commercial prospects that worldwide data access could provide. Other key discussion points that became common themes throughout the day were the need to integrate health/nutrition priorities into agricultural development, opportunities for the private sector to generate change, move agricultural development priorities from quantity to quality of production and the need to generate gender balances in all areas of agriculture. At the conclusion of Tuesday's events, I had reached a level of new information saturation and looked forward to spending the evening socialising with my newfound friends.

Although I was feeling learning fatigue from the past two days, I was also feeling a sense of disappointment that the conference events were drawing to a close. Hearing from those scholars who are currently engaged in international agricultural research on the last day, brought the topics of the whole event closer to reach and consolidated the advice and possibilities available to me as a student entering into this field. I left Canberra on Wednesday feeling like I had made leaps in my knowledge of research opportunities overseas, agricultural research targeted to development and developed a strong and invaluable network of esteemed researchers.



Kimberley Hunnam, *Charles Darwin University*

A piece of advice on Day One of the 2017 Crawford Fund Scholar Program was about the benefits of attending conferences on the edge of your research discipline, as well as those more directly related. As a PhD student researching small-scale fisheries in a developing country context, the 2017 Crawford Fund Conference on 'Transforming Lives and Livelihoods: The Digital Revolution in Agriculture' was closer to 'the edge' of my research area. However, both agriculture and fisheries are part of our food system, and there are certainly similarities and lessons to be shared across these sectors. In addition, many people in developing countries have livelihoods dependent on both agriculture and fisheries. In this sense, a highlight for me was Dr Lindiwe Majele Sibanda's Sir John Crawford Memorial Address as her key message on the importance of a nutrition-sensitive approach is directly relevant and applicable across our whole food system. With such high levels of food and nutrition insecurity in the world and the growing double burden of malnutrition, it is clear changes must be made regarding how our entire food system operates.

Many of the case studies showcased during the Conference demonstrated the value of multi- and trans-disciplinary research. This reinforced the advice given during the Scholar Days on the benefits of being 'a jack of all trades and a master of one'. Stuart Higgins' (AgImpact) talk, 'Do MAD researchers add value for smallholders?', on using mobile apps for data collection was particularly interesting as I have been considering trying out this method for my PhD data collection. The opportunity to attend the MAD Showcase after the Scholar Day was also valuable. Professor Salah Sukkarieh's (University of Sydney) talk titled 'Digital Farmhand – data analytics and robotics for food and nutrition security' also stood out for the approach his project was taking: engaging with rural schools and adapting technology to be appropriate for a developing country context. Using appropriate digital technology was a key message that came through many of the presentations. However, I thought that the gender and social dimensions of digital technology use could have been explored more, as well as some of the issues relating to maintaining individual privacy while promoting open access data.

Finally, I really enjoyed the opportunity to meet and network with a diverse range of people, passionate about research aimed at improving food security and livelihoods across the world. The presence of other students at various stages of their studies, early career researchers, as well as our mentors and other experienced scientists made for interesting conversation, and provided inspiration and motivation to continue working in this field. My one suggestion for future Scholar Days would be to make time for more open discussions and sharing of ideas, opinions and experiences, to complement and allow reflection on presentations by speakers.

Overall, I am grateful to the Crawford Fund for providing me with the opportunity to attend the Scholar Days and Conference in Canberra, and I plan to maintain a connection with the Crawford Fund and engage with initiatives such as RAID in the future.

QUEENSLAND (QLD) COMMITTEE

Fynn De Daunton, *University of Queensland*

I was lucky enough to attend the Crawford Fund Conference for 2017. As a fifth year agricultural science student with an interest in international food security, I was very excited to attend. While I understood that data and technology was an important factor in agricultural systems, I was interested in finding out more about the impacts that this can have, on both a global and local scale. I was particularly interested in the way that less developed areas are influenced compared to more developed areas, and the way that different communities interact with, and are influenced by, technology. Being exposed to so many speakers from all over the world from many different fields was an amazing experience, and I was able to learn about transforming lives and livelihoods from a range of different perspectives that I had never been exposed to before.

The scholars program ran over three days, with the first day dedicated to scholars meeting their mentors and talks from speakers involved in the agricultural sector. Our mentors were able to give us direction,



and put us in contact with people attending the conference who might be interested in the same fields as us, and who we might like to make contact with. Being assigned to a mentor is a great initiative for scholars, as it proves a point of contact and direction in what could be a potentially overwhelming experience.

Dr Lindiwe Majele Sibanda was the keynote speaker for this event, and her address was the highlight of the conference for me. In the context of many incredible speakers, her passion and personal experience made her talk stand out, and it was obvious that the entire room was inspired by what she was saying. Both her keynote address and panel discussion gave a unique perspective to the conference theme.

The biggest take away from the conference for me personally was that nutrition is a very important factor in achieving food security and a healthy population, and that this needs to be a key consideration when it comes to writing and implementing policy. Honestly, this is an issue that I had never given a great deal of thought to prior to attending this conference. Although I understand the importance of eating a balanced and nutritious diet, from a food security perspective, I have always considered caloric intake to be the most important factor.

The biggest challenge for me was trying to retain all the information from the many speakers at the conference. Every single talk over the conference was packed with information, and at times it was overwhelming trying to take everything in, and processing this information before the next talk had started.

Overall, the Crawford Fund Conference has been a highlight of my five years at university. It was amazing to hear the perspectives of so many people who are working in this field, and being exposed to so many people who are passionate about what they do. I am very excited at the prospect of potentially returning next year, and I would highly recommend this experience to anyone interested in this field.

Sarah Sutcliffe, James Cook University

“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.”

- World Food Summit, 1996

Food security is as much about quality as quantity. This message came through loud and clear at the 2017 Crawford Fund Annual Conference, “Transforming Lives and Livelihoods: The Digital Revolution in Agriculture.”

Through compelling personal stories shared by the keynote speaker, Dr Lindiwe Majele Sibanda, as well as research presentations on the main conference day and motivational advisory sessions during the Scholars’ days, I was challenged by the significance of ensuring that nutrition is the next food security priority. It is easy to focus on maximising yields to assure no one goes hungry. However, hidden hunger is a real and present threat, where people consume enough food (often processed, refined and poor quality) to be threatened by obesity and non-communicable diseases, but through a lack of dietary diversity and limited access to nutritious foods also suffer from malnutrition, stunted growth and developmental issues. I am not an agricultural scientist or nutritionist but rather a marine biologist; however, through this conference and my attendance at a World Fish symposium in Penang this year (my attendance at which was partially funded by The Crawford Fund), I have decided to focus on nutritional security in my future studies and career.

The conference obviously focused on terrestrial agriculture rather than fisheries, however attending was still a valuable experience from me. For its own sake, learning about current developments in agriculture was interesting and worthwhile. My honours research is looking at the role of fisheries in Pacific Island food security, so it was valuable to learn about the agricultural side of food security in the developing world to broaden the scope of my understanding. More broadly, there were a number of lessons that could be applied in my field. The use of mobile phone technology in communicating with rural farmers



has potential applications in fisheries, for example in collecting catch data or sending out weather alerts etc. More broadly, the importance of having large and accurate global data sets and the associated challenges of collecting that data in the developing world is equally applicable in the fisheries sector.

I think the most valuable part of the conference was the scholar days. They provided an excellent opportunity to get advice from people in a range of positions with different experiences. We heard everything from broad motivational career advice to specific recommendations on how to network and apply for jobs. For me, the most interesting sessions were from young and early-career researchers doing research for development overseas. It was both interesting and useful to hear advice on how to maximise your effectiveness overseas, both personally and professionally and tips for working within a different culture.

Overall, I think that the conference serves an important role in connecting and promoting dialogue between different demographic groups within the agricultural research for development sphere, be it across the private/public/academic divide, between scientists and policy makers or between generations. I would certainly recommend the Crawford Fund Conference to any student wanting to make connections and hear a broad range of perspectives on cutting edge agricultural research.

John Fasi, University of Queensland, School of Biological Sciences

Thank you for the opportunity to attend this conference and I am one of the fortunate scholars from Queensland, to be selected as a Crawford awardee. My profound gratitude to the Crawford Fund Queensland Committee for the award. It is always great to attend a conference on what we are passionate about, “food for a secure world”, agriculture.

I must congratulate the organising committee for a wonderful and a very well organised conference. I had a pleasant time with easy access to the venue and accommodation. The presentations by speakers both at the Eastlakes Football Club and at the Parliament were the highlight of the conference. The opening address by Dr Lindiwe Sibanda and Professor Andrew Campbell were very enlightening. As someone who has just completed a PhD in the broad field of agriculture, I find the journey these both took in their early career though contrasted but with similar ambition and outcome. Their talks gave me a broader perspective to break into new grounds in international research in agriculture. I must add that experience of researchers doing work, as volunteers in developing countries were very enriching for me. The opportunity in the private sector was specifically great particularly as we were lead into a wide range of opportunities available in that sector.

The dinner arrangements which allowed for meeting up with others and discussing areas of interests and opportunities were excellent. It brought in many others who have wide experience as both academics and practitioners in the broad field of agriculture, and provided a very in-depth pool of people with vast knowledge and experience I could network with. I had the opportunity to meet many of those I wanted to talk with and share my interests.

The topics covered on the second day at the Parliament were just exceptional. The choice of speakers was great. From policies to technologies, research work and practicing in Australia and overseas, particularly in the developing countries was great. As someone from a developing country (Solomon Islands), I find such work very relevant and something I can be part of. Although, these studies and work were conducted in other countries, I find them as opportunities I can also do in my home country, as there are a lot of similarities in all the aspects of the communities as well as the challenges. I am sure with the support from groups such as ACIAR, opportunities are available for such work to be conducted in other countries such as Solomon Islands.

The mentoring arrangement was also another highlight of the conference. I am grateful to the organising committee for such arrangement because it really supported me in exploring opportunities in making new grounds in agriculture research and job opportunities. I really owe my mentor Dr Rohan much gratitude for his time and putting me up with some of those who share my area of interests. It was truly a rewarding experience.



Lydia O'Meara, *Central Queensland University*

"It is not enough to feed a nation; we need to nourish the people."
- Dr Lindiwe Sibanda

I was inspired by Dr Lindiwe Sibanda's Sir John Crawford Memorial Address titled 'A New Narrative for Ending Hunger' wherein she challenged the audience to use agriculture as a key tool to improving population health. Specifically, Dr Sibanda called for agricultural research projects to incorporate a stronger focus on improving nutrition security. She drew on her extensive experience as an animal science researcher in Africa to share personal case studies of how certain agricultural projects focusing on increasing calorie consumption (e.g. grain based farming) can contribute to the dual-burden of chronic disease in developing countries. For example, in some communities it has been observed that levels of childhood stunting and adulthood obesity occur in the same household demonstrating that families might be consuming adequate carbohydrates but are missing out on crucial micronutrients sourced from fruits and vegetables required for adequate physical and cognitive growth. This affirmed to me how crucial it is for research for development projects to involve multiple disciplines to ensure a holistic approach. I found that this support for better collaboration between the public health and agriculture industries was echoed in other keynote presentations and shared by many conference attendees - including experienced researchers in CSIRO and ACIAR.

The key theme of this year's conference revolved around the role of digital tools in agriculture. I was encouraged to learn how mobile-acquired-data apps like CommCare can be used to not only improve the efficiency of collecting data on the field for the researchers but how digital apps can be used to give back to the farmers in real-time. For example, Stuart Higgins Director of Agricultural Impact International shared a case study from Vanuatu where researchers worked with cattle farmers to assess the impact of using the CommCare app. The project team found that inputting the weight of cattle directly into the app reduced data input times and made it easier to collate and analyse the results. It also meant that the researchers could print a report outlining the weight of the cattle and give this back to the farmer at the end of each day. This enabled the team to empower the farmer with knowledge in real-time which can enhance uptake and retention of participants. It was exciting to see how digital apps enable the two-way exchange of knowledge for the benefit of all stakeholders both researchers and smallholders.

In conclusion, I would like to thank the Crawford Fund for providing the comprehensive Scholars program to enable early career researchers such as myself to attend the annual Crawford Fund Conference – this year entitled, "Transforming Lives and Livelihoods: the Digital Revolution in Agriculture." As a Public Health Nutrition student who is just about to commence my Honours year of research exploring the food security of Pacific Islander farmers involved in ACIAR research-for-development projects, participating in this conference occurred at an opportune moment in my career. It gave me an invaluable opportunity to learn from experts in the field of international agriculture research and to network with like-minded peers.

SOUTH AUSTRALIAN (SA) COMMITTEE

Chandnee Ramkissoon, *The University of Adelaide*

I have been lucky to have won a scholarship to attend this year's Crawford Fund conference in Canberra, titled "Transforming Lives and Livelihoods: the Digital Revolution in Agriculture." I applied to this conference because I have always been passionate about food security and sustainable agricultural systems especially in developing countries. This year's conference looked at a specific aspect- could access to better interpretation of data and information herald improvement in agricultural productivity and profitability in these countries and Australia? I learnt from the various keynote speeches as well as informal discussions that the answer is yes. I left this conference - my first - more inspired and prouder of the scientific community than ever.

The conference got off to a great start by one of the most inspiring speeches ever made by Dr Lindiwe Sibanda. The key message that I take from her heartfelt speech is that there is now, a greater need than



ever, to move towards a nutrition-sensitive agriculture. She made me realise the importance of tailoring solutions to food security according to each system's resources and nutritional needs. Most importantly, she made me believe that it is all possible if we all, scientists and policy makers, join forces and move towards an integrated agricultural system.

Networking was certainly one of the highlights of this conference. The ability to meet such high-end researchers in a comfortable, informal environment made it a very enjoyable experience, which traditionally in conferences, can be quite daunting for young students. The mentoring part was one of my favourites because it facilitated the integration into the bigger crowd as well as the face-to-face interaction with researchers and/or industry professionals significantly. I was also lucky to have been invited to the reception post conference, where my mentors, Mr Roger Wickes and Dr John Radcliffe were very helpful in bridging the gap between myself and prominent researchers, politicians and other professionals.

Another highlight of this conference was the inclusion of the private sector in the talks. When dealing with scientific projects especially for developing countries, the impact assessment is on the environment and/or society- very fair but I think this conference highlighted the importance of making the projects economically viable as well, hence truly supporting sustainability as a three-pillar system. All these talks have on one hand, helped me broaden my thinking horizon and on the other, helped put things into perspective.

In summary, this year's Crawford Fund conference has been an amazing experience. I left this conference truly inspired and very grateful for this opportunity. Sitting amidst, and mingling with, professionals who have carved such an inspiring career path for themselves has been an honour. It helped cement my own goals and aspirations, which are to partake in international agricultural development programs and make a difference in the world. The first step is to join RAID in South Australia and build a network with them. Personally, this conference has been a game changer. I would not think twice before recommending it to anyone interested in international agricultural programs. Thank you Crawford Fund.

Yanchen Zhang, *The University of Adelaide*

I wish to express my deep gratitude to the Crawford Fund for sponsoring my attendance at the conference and scholars' activities. The benefit I gained from the whole event is more than what I thought before I arrived in Canberra.

This year the topic is transforming lives and livelihoods: the digital revolution in agriculture. The topic itself is inspiring and it makes me expecting the opening of the conference. As a PhD student from soil science, I always want to know more about the practical agriculture related to soils, such as how to improve plant available nutrient, how to control soil water content in the field, and how to utilise my basic data into agriculture practice. The digital revolution can not only provide me the access to different agriculture development, but also can inspire me with new thoughts relevant to my own project.

I found most talks during the conference were inspiring, especially the talk about robotics for food and nutrition security from Prof Salah Sukkarieh. He introduced some initiatives about utilising robotics for digital farming, which will be innovative approach to achieve global food security. In some dry regions, those high-techs can help farmers to do irrigation in a smarter way and in this way, plant available water can be controlled, which can ensure the crop growth, especially for developing countries. I think I have to mention the Sir John Crawford memorial address by Dr Lindiwe Majele Sibanda as I am also one of the scholars inspired by her talk and career. Her speech about her grandmother touched me for a while. She is really an authoritative leader in agriculture, nutrition and climate change and did a brilliant job for African agriculture. She mentioned how important it is to make farming diverse and achieve nutrition security. I got a chance to talk to her during lunch time which would be a motivation for my own research.

The highlight of this conference was to be surrounded by many seniors from different parts of agriculture, from people working in scientific institutions and universities to people working on the social



and economic aspects for agriculture development. The first time I heard the talk from an agricultural company such as Bayer, which was interesting and impressive. Their projects make me feel the real meaning of science, which is for a better life. They have made an important contribution to providing a reliable supply of high-quality food, feed and plant-based raw materials all across the world. GODAN is a very good example for sharing open data to make comprehensive information about agriculture and nutrient available. This makes me feel the access to interdisciplinary, which means that we can not only achieve food security but also nutrition security in the future.

The chance for networking is fantastic and I appreciate many talks with those mentors during the whole conference. They are really nice and helpful. They are happy to introduce themselves, what they have done for agriculture and their opinions about the conference. Those are really good opportunities to expose myself to the agriculture field. I feel very happy that I can ask the right person for the answer to my general questions. I also made some connections with my peers. They are passionate about their own research or jobs. I will be in keep in touch with those scholars that I met during this conference and looking forward to future Crawford Fund events.

TASMANIAN (TAS) COMMITTEE

Sohail Ayyaz, *Tasmanian Institute of Agriculture, University of Tasmania*

This year, I was sufficiently fortunate to be chosen as a researcher to attend the Crawford Annual Conference 2017, “Transforming Lives and Livelihoods: The Digital Revolution in Agriculture”. I joined researchers from all over Australia for a prologue to worldwide agricultural research in Australia and to figure out how, as understudies, we can make a commitment in the advancement of nourishment and food security around the world. The key message of the conference was achieving food and nutrition security by unlocking the potential of digital agriculture through innovative technologies and big-data for small and medium farmers.

First thing, I was very impressed by the story shared by Dr Lindiwe Majele Sibanda about her “Grandmother’s Farm-Nourishing Africa and the World”. As it described the struggle of small farmers and her commitment towards nutrition and food security for millions of small farmers and their families including women and youth of least developed and developing nations of the world to achieve sustainable agriculture. It also compelled me to design my future agricultural research to achieve nutrition and food security through sustainable agriculture. Further to it, economics is also very important to utilise resources efficiently to achieve sustainable agriculture as stated by the Honourable Barnaby Joyce MP (Australia’s Deputy Prime Minister), “There is great attachment between economics and agriculture”. Both of these speeches strengthen my research paradigm (Social-Economic-Environmental-Policy) to address the issues impeding the small and medium compatible agro-businesses in the world.

The Crawford Annual Conference 2017 provided young scholars with a fantastic opportunity to learn about some current efforts by Australian scientists working in developing countries and to utilise “Big Data” approaches to improve the sustainable agriculture through digital agriculture, and democratise the benefits for the 570 million small farmers around the globe as they are producing 70 per cent of the world’s food. I benefited from many speakers but mainly Dr Steve Mathews, who presented “Big Data / Modern Analytic Techniques” followed by case study “Global Data, Farm Size, Nutrition and Food Security” by Dr Mario Herrero. Another presentation equipped the young agricultural scholars about issues hindering the digitalisation of agricultural systems and overcoming barriers to digitalise agricultural systems in the developing countries by Dr Andy Jarvis.

My mentor and state coordinator connected me with different researchers working in agribusiness and they gave magnificent counsel about building up a system to accomplish my future professional objectives and were likewise glad to remain in contact and give future guidance. In any case, the feature for me was organising with alternate researchers and guides. These networking dialogues were phenomenal since they not just enabled me to advance my own particular research yet additionally



encouraged inside and out exchange about conceivable subsequent stages for my venture, and enabling me to add to other specialists' thoughts. Huge numbers of these talks have proceeded after the meeting and I expect will encourage facilitate coordinated effort to enhance the manageability of agrarian frameworks.

In the end, I want to thank the Crawford Fund and Cathy Reade for giving me the chance to go to this extraordinary gathering. It was extremely instructive and I would rush to prescribe this occasion to any other individual that is energetic about horticulture for improvement.

Oliver Gales, *University of Tasmania*

The revolution that is 'digital technology' formed the title for this year's Crawford Fund conference "Transforming Lives and Livelihoods: The Digital Revolution in Agriculture." I was fortunate enough to attend the event where the pressing issues surrounding global food security, an ever growing world population and the unprecedented opportunity 'Big Data' provides for alleviating poverty and hunger were presented and discussed by world leading keynote speakers.

As an undergraduate studying my second year of a Bachelor of Agricultural Science at UTAS, the conference opened my eyes to the importance and range of opportunities there are for graduates in being able to make a contribution towards achieving global food security.

Dr Lindiwe Majele Sibanda gave The Sir John Crawford memorial address titled 'A New Narrative for Ending Hunger'. Dr Sibanda gave a heartfelt and inspirational speech on the importance of food security, and the need for an integrated global approach using nutrition as a driving force to ending hunger.

Dr André Laperrière addressed the importance of data being knowledge and empowerment to allow smallholder farmers to make better and more informed decisions. These are just two of the numerous speakers who addressed and raised important topics surrounding international agriculture. To have the opportunity to not only listen to such acclaimed and experienced speakers but be able to ask questions during question and answer times as well as networking sessions provided an incredible opportunity.

It has been an absolute privilege to have had the opportunity to attend the Crawford Fund Conference and scholar days, an experience I can not speak highly enough of. To learn about the projects building capacity in developing countries and the impacts they have to improving the lives of others is inspiring.

A common theme across all the projects was the importance of social relationships to ensure the greatest success and outcomes for the projects. To meet such an enlightened group of people who have been a part of and lead so many projects in developing countries highlighted the importance of international agriculture to building capacity and improve international food security, and the opportunity there is for agricultural graduates to improve the livelihoods of others.

The range of expert and passionate keynote speakers, opportunities to meet other like-minded students and graduates, and exposure to incredible sources of inspiration are just a few reasons why anyone interested in agriculture should attend the conference. From frontier technology to the importance of cultural social relationships, the conference covers a range of topics that will certainly capture the attention of anyone involved or seeking to be apart of agriculture and its importance internationally.

The journey ahead for global agriculture to ensure every human has access to nutritious and appropriate levels of food is enormous. There is no easy solution and it will take the collaboration of data, resources and scientific knowledge to increase food production to meet the growing demand. After hearing from the speakers and delegates at the Crawford Fund Conference and the enthusiasm of the scholars who are passionate about international agriculture, it made me excited about the path ahead and to walk that journey with like-minded peers.



Kristy Stevenson, University of Tasmania

This year I was fortunate to receive a scholarship from the Crawford Fund to attend the Crawford Fund conference 2017, “Transforming Lives and Livelihoods: The Digital Revolution in Agriculture,” held in Canberra. The Conference was both informative and challenging. We heard from some incredible speakers, with the conference opening on Monday night with an address from Dr Lindiwe Sibanda. This address highlighted the importance of crop diversity in small scale mixed farms, as a diversity of crops provide a range of essential nutrients. Research presented by Mario Herrero displayed that as farm size increased the nutritional diversity of the food produced decreased. Both speakers highlighted the importance having a strong focus on nutrition as the problem of global food insecurity is addressed. The topic of nutrition became one of central themes of the conference.

The role of big data in agricultural systems was presented in several contexts. André Laperrière highlighted how big data can be made accessible and applicable to the “the little guy”. That a mobile phone can be the tool which connects the small holder farmer to open source big data sets. For this data to be fully utilised it needs to be findable, accessible and solve a problem. Steve Mathews displayed how this can be made possible, arguing that data needs to be cleaned, sorted, free and presented in an understandable fashion. He also highlighted the work that needs to be undertaken to better integrate technology into all agricultural systems. He provided data which showed the agricultural sector to have the lowest adoption of digitalisation of 23 sectors. Dr Ken Street gave an example of how big data can be used to inform breeding programs for crops with increased resilience to environmental and biological pressures. This has been achieved using a system termed FIGS, which layers multiple data sets to identify environments where suitable germplasm may be located. This case study highlighted how big data can be applied in a simple way to achieve outcomes with large impacts.

Each of the scholars was paired with a mentor for the duration of the conference. The mentors challenged our views of the topics discussed, and were invaluable during the networking events. It was an amazing opportunity for the students to meet, and learn from, men and women who have been so influential in the area of agricultural development.

The scholar days, hosted by RAID were highly beneficial, and provided scholars the chance to discuss in-depth topics highlighted during the conference. It was exciting to hear about the many opportunities young people have to get involved with research for development. It was also encouraging to hear about the large positive impacts, seemingly small projects are having in communities around the world. The conference was a fantastic couple of days I would recommend it to anyone with an interest in combating the issue of global food insecurity.

VICTORIAN (VIC) COMMITTEE

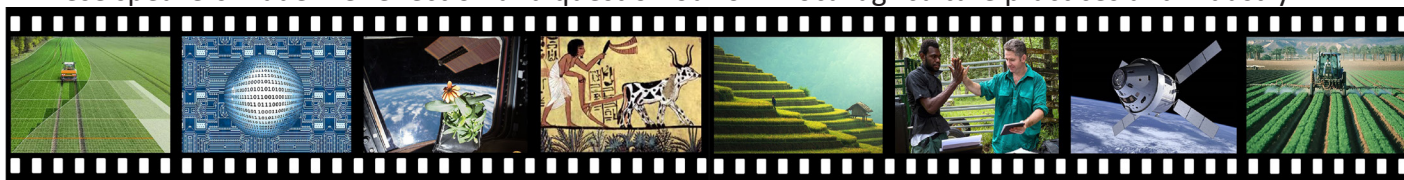
Melanie Addinsall, Agriculture Victoria

‘Nutrition sensitive agriculture’ was a powerful message for me from the 2017 Crawford Fund Conference. The need for nutrition sensitive agriculture was beautifully captured by Dr Lindiwe Sibanda’s story of her grandmother’s farm. The damaging changes made to the farm to make money in the name of a better life, remind us that agriculture extension must be delivered hand-in-hand with nutrition and health education.

The conference also highlighted to me that any action to ensure global food and nutrition security must be complemented by family planning.

Having a background in sustainable agriculture, I was excited by Dr Mario Herrero’s findings that more diverse landscapes produce more food and more nutrients. His concepts of using nutrition as a driver for shaping industry, promoting sustainable intensification without losing diversity, and using policy to influence industry structure, are relevant both locally and globally. He also reinforced the need to promote better linkages between agriculture, nutrition and health.

These speakers made me reflect on and question our own local agriculture practices and industry



structures. It highlighted the need to shift our industry focus from production to nutrition, to ensure healthy populations.

Another key message from the conference was the importance of understanding what happens inside the household, to understand practice change and nutrition security. The impact of domestic violence, imbalance of power and division of labour is paramount when considering these issues. Educating both men and women, starts the conversation inside the home which leads to better adoption. This concept of reaching more than one person in the household to enable practice change, is relevant in an Australian context also.

I found Dr Andrew Mude's presentation on insurance and risk greatly insightful, in particular how risk makes farmers poor, and keeps them poor because it deters investment.

The conference highlighted the incredible innovations in agriculture technology that are being implemented. In particular the impact of connecting small holder farmers with information so that profits are shared more equally across the supply chain. Also connecting farmers with information to aid the adoption new production practices.

Currently working in agriculture and rural development policy in Australia, I am able to draw significant parallels between issues for farmers in a developing context and locally. Issues include ensuring healthy and diverse landscapes, agriculture technology driving rural change, migration of young people to cities, connecting people to enable prosperity, and achieving adoption and practice change. The conference provided ideas and solutions to address issues, and insights for how government and policy can stimulate change.

The conference helped me to clarify my interests and future directions, which lie at the interface between humans and landscape, and ensuring agriculture provides nutrition for healthy and happy people.

The conference content was stimulating and interesting, but the networking and conversations were the highlight. It was a pleasure to meet many of the Crawford Fund board members, and the interesting and talented scholars. In particular those scholars who were from developing countries and who were able to share their personal experiences.

It was a great privilege and honour and to attend the conference as a scholar, and I look forward to ongoing interaction with the Crawford Fund in the future.

Sophie Lamond, University of Melbourne

It was an illuminating experience to be invited to attend the 2017 Annual Crawford Conference, "Transforming Lives and Livelihoods: The Digital Revolution in Agriculture." I was heartened and inspired by the John Crawford Memorial Address delivered by Dr Lindiwe Majele Sibanda, A New Narrative for Ending Hunger. One of the recurring themes of my education has been a focus on systems thinking and I was glad to see her call to action focused on the need to consider the multi-faceted and often complex and contradictory facets of food security. It is imperative that we consider nutrition security while we work towards efforts to ensure food security for all people. I believe that telling compelling stories is one of the most powerful tools we have at our disposal in promoting the work of development. It was a privilege to have Dr Sibanda tell stories of her own family's experience of changing agricultural practices and the impact it had on her own family. I have since discussed her story with my students studying food systems as an illustration of how global trends can impact individuals. Having access to these personal stories is a powerful pedagogical tool.

Over the three days I spent with the Crawford Fund and my fellow scholars it was obvious to me how much of the strength of the organisation rests on the ongoing investment in mentorship. Among my favorite presentations on the first day of the program were those that expanded upon the fruits of long-term mentorships in developing countries. It was inspiring to hear stories about young university students who had, though the course of their association with senior agricultural scientists, grown



confidently into their roles as independent researchers. From this first day I was very struck by the re-iteration of the notion 'to be a T shaped person' offered by one of the mentors. I am involved in a variety of different activities and work fields and the idea that it is important to be good at many things but a committed specialist to one area of expertise is advice I needed to hear. It was very beneficial to hear the stories of the mentor's careers and to see how their investment in an area of expertise had manifested over their life's work. Throughout the conference it was equally inspiring to meet the other scholars and mentees and to learn of the many different careers young people were embarking on to contribute to agricultural development. I hope that the links made during this conference will be the foundation of long and fruitful associations.

I found many of the panelists presented on interesting aspects of digital livelihoods. I particularly enjoyed hearing from Dr Mario Herrero from the CSIRO. I felt that his presentation coupled well with Dr Sibanda's keynote and linked the importance of data to farm productivity and nutrition security. I was pleased to hear his assessment that the key to nutrition security is diverse landscapes and that more diverse farms produce more nutrients. I also enjoyed hearing about the work of Professor Salah Sukkarieh and his work with data analytics and robotics. I was struck by how he has worked to pursue community inclusion in his highly technical field. I loved hearing about how he not only included school workshops in his research but the extra effort undertaken to include parents so that they could gain insight into the technical skills their children were developing. I was especially interested to hear how he was reaching out to indigenous communities to encourage entrepreneurialism for food security.

I would encourage the Crawford Fund to make a more active effort towards inclusiveness. I was disappointed by a program that managed 15 per cent female representation. It was heartening to see so many young women in the mentor program but much of the conversation among this group frequently noted to lack of women in the program and how this reinforced the lack of gender parity in agricultural fields. It was also disappointed by the lack of indigenous representation and surprised at the absence of a welcome to country acknowledgement at an event held at Parliament House and the apparent absence of indigenous participants. I look forward to seeing the Crawford Fund make improvements in these areas.

Overall the Crawford Fund conference was a stimulating experience and the chance to become part of a network of those passionate about agricultural development is invaluable. I thank the Crawford Fund for the chance to be a part of this incredible experience.

Helena Smith, Agriculture Victoria

I am writing to share with you how I benefited from the Crawford Fund 2017 Conference, "Transforming Lives and Livelihoods- the Digital Revolution in Agriculture," on 7-9 August at Parliament House, Canberra and what I consider to be the highlights and key messages.

I benefited from the Crawford Fund 2017 Conference in three ways. Firstly, I had ample opportunity to network with the Crawford Fund Committee, delegates and scholars during the scholars' days activities, conference dinner and conference. As a consequence, I was able to meet and build relationships with a wide variety of people involved in agriculture, from undergraduate, master and PhD students, to people working in the private or public sector. I really enjoyed meeting so many people united by their interest in or passion for agriculture and international development. In addition, I was pleasantly surprised by the number of people I met who had a connection to Victoria's Wimmera region and/or its residents: the Crawford Fund Victorian Committee Chair Dr Gregson, Prof Burgess, Prof Lemerle, my mentor Prof Brown and scholars James Hawkins and Natasha Brohier.

Secondly, I was able to explore possibilities for involvement in international agricultural research and development having been allocated a mentor from the industry and actively participating in the scholars' days activities. My mentor shared with me their career journey, encouraged me to build relationships with people in my current work area and with those whom I would like to work with in the future and helped me connect with other delegates during the conference and scholars' days.



Highlights from the first scholars' day activities were the relatable and thought-provoking presentations by Dr Sibanda and Prof Campbell. I appreciate the advice they gave while addressing how to break into the international agricultural industry. This included being clear on why you are doing what you are doing, finding at least one thing you can learn from the things you are currently involved in, cross-examining the way you respond to new opportunities and being true to who you are when seeking opportunities for personal and professional growth and development.

Thirdly, I increased my awareness of the digital revolution in agriculture and how it can transform lives and livelihoods throughout the conference. The key message that stood out to me from the conference was for people in the agricultural area to work together by increasing collaboration across their various disciplines and sharing information and data that is generated in projects to benefit the lives and livelihoods of smallholder farmers. Highlights from the conference were the practical presentations by Mr Higgins and Prof Sukkarieh which featured fantastic videos showcasing the application of their work with mobile acquired data and robotics, respectively, overseas in the field. These presentations stimulated much interest from conference delegates and highlighted the type of digital advances in agriculture we can expect to continue to develop and impact global food security in the future.

Other highlights of the Crawford Fund 2017 Conference included making friends with the scholars I shared an apartment with, networking with some of the scholars before the first scholars' days activities over morning tea and sharing experiences and reflections of the conference with a few of the scholars at the conclusion of the second scholars' day over lunch.

The Crawford Fund 2017 Conference was a wonderful and enjoyable experience. I sincerely thank the Crawford Fund and its Victorian Committee for the opportunity to attend this year's conference as a scholar.

Natasha Brohier, La Trobe University

This conference was an eye-opener in many ways. Among the many activities and talks, interacting with other scholars and attendees was the highlight of the event for me. The conversations provided me perspective on the involvement of a diverse group of experts all working for a common goal. This led to the opportunity to recognise the roles of different attendees, their contributions and how it affects farmers both in Australia and in developing countries. This ranged from scientists dealing with farming in developing countries or climate change all the way to policy makers. Not to mention, the conversations helped me understand what role I play in the grand scheme of things and the direction I could move into post PhD.

In terms of topic, from my perspective, 'big data' would encompass genomic, phenomics, nutrition and even climate data. With Dr Ken Street talking about genebank mining and Dr Mario Herrero on nutrition, they encompass the build-up and even simplifying the search for these types of data. This conference, however, enlightened me on a different complexity of the agricultural industry where these data are of distant importance to small farmers in developing countries. Important as it is to scientists to aid them, the data collection of crops and herds along with environmental observations and trade of everyday dealings would accumulate a different kind of data. This could be as simple as data entry of total produce or even planting records. With this, farmers can increase their yield while suffering minimal loss.

Another topic that I found interesting was how do we communicate or impart these data and knowledge to farmers or even vice versa, which is collecting data from them in rural areas. It never occurred to me how valuable this exchange of information is, be it on how to combat new pathogens and pests invading farmlands for them to receiving data of their production. To impart knowledge or receive data from someone so isolated seems like a major task but yet it is now being made possible. The brilliant ideas of apps and call centres, be it from MAD, or other organisations, can connect farmers with valuable information while building up an agricultural digital ecosystem.

In what way would this affect me though? It affected me in a way to look at my research and the agricultural industry from a different perspective. I cannot agree more with the necessity to improve



the technology for farmers, both on field and data wise. The importance of communication between innovators, the scientific community, the farmers and marketers all needing to work together is vital. Lastly, the diversity in nutrition as stressed by Dr Sibanda's moving memorial address affected me. Coming from the scientific community it is important to know what is needed by the agriculture community and to help push for technological advances to make the agricultural industry among the top industries in the digitisation index.

WESTERN AUSTRALIA (WA) COMMITTEE

Xin (Bob) Du, *Murdoch University*

The Crawford Fund Conference is an important event for international development, which focused on the critical food challenges for global sustainable development.

I have worked in Post-harvest Biosecurity and Food Safety Laboratory for four years. My research interest areas are food safety and nutrition. I think my research interests will benefit developing countries. So the Conference was an excellent opportunity to make the linkages with people who had lots of experience with the ability to see the potential benefits my research could offer developing countries, and to point out to me strategic avenues for me to engage in. This was important, as I am keen to ensure my work results in immediate benefits both to the wider community and to myself as a scientist benefiting the world. During the mentoring program on the Crawford scholar day and conference, I was mentored by Prof James Ridsdill-Smith, who gave me many useful suggestions on how to engage with researchers and policy makers in agricultural science both inside and outside Australia.

The two half day lessons were also pretty handy to me, as a young early career researcher. This was from a number of points of view; I collected many new ideas that resonated with my research interests from both senior research scientists and young scientists. For example, how to become motivated, the importance of developing skills in data management and analysis, understanding the value of doing a PhD, and the importance of good supervisors. I definitely felt the lessons were well prepared and designed to cover everything needed for all scholars attending the Conference.

I believe the Digital Revolution in Agriculture will definitely benefit agriculture development internationally; the questions for me were how to effectively engage in the post-harvest field and to understand how much the new technologies can cost farmers. I captured and absorbed comprehensive knowledge around digital solutions from the speakers at the Parliament House Conference, and I am now going to consider the use of digital solutions in my areas of research. One of the important lessons from the conference was how to share the data, to make it easily accessible and to apply the knowledge I obtain to benefit international agriculture development. In addition, I am curious enough to keep an eye on how to validate and to quality control shared data.

In summary, the 2017 Crawford Fund annual conference was extremely beneficial to attend and to meet people who are working in areas related to my research interests. I also met a lot of people who are not working in the same area as me, e.g. agri-business, social work, volunteering to name a few. Through the conference program, I obtained many new ideas and my vision and aspirations changed. I have now re-assessed as to how I might deliver my research findings to people and communities outside Australia. I now understand how important and necessary it is to work with social scientists, value chain specialists, international volunteers, agri-business people and others in disciplines outside my immediate research area, if I am to effectively get my research used widely both internationally and in Australia.

Education, mind exchange and networking were the three key words I returned with after the conference. My bag was full of take home messages when I came back to Perth, and I couldn't stop talking about the conference to my colleagues. Finally, I add the Crawford Fund introduction into my talks I give to overseas students and visitors on training programs to our laboratories in Perth. We have many visiting groups from Thailand, Iraq and China.



Sara Hyde, Facey Group Inc.

The greatest challenges we face are those that we sometimes are not sure to take ourselves; but influenced and encouraged from our peers. Until a few months ago I personally had not understood what the Crawford Fund was, let alone what it did or the opportunities it could provide.

After being selected to represent WA as a scholar and embark on a two-day conference with such amazing people, I wish that I had been informed of this great organisation, and the work they do a decade ago when I was leaving university.

In saying that I am challenging myself, to ensure that I can get the message out to the next generation and expose them to the amazing opportunities that they can embark on. I am not a scientist, but have been involved in research over my career. I have always been passionate in connecting people and in my career have invested much of my passion to on ground delivery of information and research to ensure farmers are getting the answers and issues they need addressed, to ensure continued growth and sustainability in feeding the world.

The Crawford Fund gave me the most amazing experience in meeting so many people from within Australia and throughout the globe, working in agriculture and of the same passion for feeding the world and remaining sustainable. The scholarship allowed for me to expand horizons and contacts in which I would not have traditionally come across in my day-to-day work; and I am hugely thankful for the opportunity.

Whilst I have worked in agriculture for close to eight years, I must admit that my thought pattern had never previously expanded far from the farm gate, and the provisions for being successful were to produce more and ensure that markets were accessible. The Crawford Fund really opened my eyes to the need for looking further, globally and with more of a focus on actually feeding the world 'nutritionally' not just by quantity.

I am hugely excited to transfer this knowledge and inspiration onto the next generation and for those who are still working within the agricultural industry or would like to enter into it. There are so many experiences all over the world and through many different facets, and I encourage you all to ask the question and challenge yourself to do something for the industry that we all work in each and every day.

Whilst research is critical, the follow on from this is to ensure that it is adopted and that the extension is completed correctly for all involved to benefit. I am challenging myself moving forward to embark on opportunities to disseminate information from research not only locally but internationally and hope that grower groups can provide a key link to the delivery of programs and assist in the evaluation of adoption on a great scale; with experience in peer-to-peer learning and specialised programs.

Thank you immensely to The Fund for your support, I look forward to many opportunities moving forward and for the extension of knowledge of such a wonderful industry that feeds us all every day.

Ana Manero Ruiz, Australian National University

As a first-timer to the event and a close-to-graduation PhD student, I found the 2017 Crawford Fund conference and scholarship program to be an extremely valuable experience for a number of reasons.

First, I have learnt from a wealth of knowledge emerging from a number of young and senior researchers from multiple backgrounds. One of the most enriching aspects was the fact that, as participants, we were not necessarily linked through our area of expertise (as it often happens in professional gatherings), but rather by our common desire to make a difference in the world through smarter, better agriculture. Thus, the conference has broaden my research interests and sparked my curiosity in fields as varied as robotics, big data, mobile technologies, parasites, genetics, nutrition security, ethics, diversification, and policy, among many others. As PhD students, we tend to concentrate on our own narrow area of research (otherwise, we would never graduate!) and sometimes lose sight of the bigger picture.

Attending the Crawford Fund event has definitely helped me put things back into perspective and



gain a better understating of how many multi-disciplinary pieces fit together into the jigsaw puzzle of international agricultural development.

Another aspect of the Crawford Fund conference that makes it a unique opportunity for young researchers is the mentoring program. Whether you are the shy type or a natural extrovert, making meaningful connections at large events is never an easy task. Crawford mentors not only took the time to get to know their scholars, but also helped us understand 'who is who in the zoo' and introduce us to those who could give us a particularly helpful word of advice. Personally, I've met some researchers outside of my area of expertise, whose work I find fascinating and want to learn more about. At the same time, having colleagues say: 'I don't know the answer to your question, but I'll get you in touch with someone who does' made me appreciate the power of the Crawford Fund network. If it's true that we are all connected in this world through 'six degrees of separation', then the Crawford Fund has definitely helped me bridge at least three of them.

Finally, I'd like to reflect on the fantastic opportunity to connect with other students and young professionals through the scholarship and RAID programs. Sharing breakfasts, dinners (and even rooms) with other fellow scholars has made this conference one of the most fun and enjoyable, from the personal standpoint. If not at the Crawford Fund conference, where else would you find yourself enjoying a late dinner, on our capital's foreshore, with a bunch of newly-met friends, laughing your hearts out over your fieldwork misadventures?

AUSTRALIAN AGRICULTURAL AND RESOURCE ECONOMICS SOCIETY (AARES) QLD

Alisher Ergashev, *Queensland Department of Agriculture and Fisheries*

It has been a pleasure to be awarded a scholarship to attend The Crawford Fund conference in Canberra. I therefore would like to thank the Queensland branch of Australasian Agricultural and Resource Economics Society for giving me that opportunity. In particular, many thanks go to Professor John Rolfe, Dr Andrew Zull and Dr Peggy Schrobback for their generous contribution.

Being an early-career researcher with a lack of working experience in Australian context, I was able to build up my professional network through the conference participation.

In particular, I enjoyed fruitful discussions with my mentor – Honorary Professor Malcolm Wegener, who was very supportive in connecting me with his colleagues as well as passionate about the contemporary issues in agriculture and food industry. We are both keen to catch up over coffee from time to time, since we are both based in Brisbane.

From interesting presentations by high-calibre researchers and experts, we have learned a lot about uses and challenges of modern technologies for agricultural development and food security. The audience was very pleased to listen to the informative and interesting presentations. In particular, in her Sir John Crawford Memorial Address, Dr Lindiwe Majele Sibanda shared a story of her life, full of emotions and empathy. With big challenges throughout her career, she could become a great mind-setter not only for her Zimbabwean compatriots, but also for many young people worldwide. Thanks a lot to the conference organisers for having Lindiwe with us. I was also introduced to the network of Researchers in Agriculture for International Development (RAID), whose young and motivated members shared their experience of working in developing settings. Now, I am very excited to be part of RAID, and for that I started collaborating with the Queensland representative of RAID, Bianca Das, who has shown her passion in building a platform for young researchers.

Certainly, I am very grateful to The Hon John Anderson AO, Professor Andrew Campbell, Dr Colin Chartres, Professor Shaun Coffey and all other people who have been working hard to maintain high standards and the great reputation of The Crawford Fund in Australia and worldwide. I am especially happy to meet Cathy Reade, whose enthusiasm and brilliant organisational skills made the conference run smooth and exciting. Thanks Cathy for your warm smiles in cold Canberra. Last but not least, the honour to become a member of The Crawford Fund is hard to overestimate. Being passionate about



making a better change for the sake of global food security, I am now happy to share this drive with my senior colleagues. Thank you very much.

AUSTRALIAN ANIMAL HEALTH LABORATORY (AAHL), CSIRO

Linjun Jing, *The University of Melbourne*

I am so honored I've been sponsored by Crawford Fund this year. As a first-year graduate student, I am always expected to know what my potential career will look like and the Crawford Fund Conference offered a good opportunity to answer my question.

In the conference, the most exciting technology would be robotic technology presented by the University of Sydney. Everyone was fascinated by the latest technological improvements and imagining if this technology would be applied in practice massively one day. This drives me to think if there could be a method in a reasonable price to be afforded by farmers and government. To balance science, technology and markets would be a tricky issue but also interesting research topic, because in my point of view, technology added market value would value the most. The ideas from this section gave me an innovative idea for my research project. Our research team is trying to establish a meat premium product system model reducing food wastage and other costs in the value chain, but we didn't test this model in its profitability level yet.

The theme "for a food secure world" attracted many scholars who focus on agricultural development in developing countries. Among all scientific researchers, QR codes presented by Dr Pham Thi Sen impressed me a lot. In China, QR code is the most popular way to pay for all bills, such as electricity, water, restaurants, even online shopping, but we never utilise this as a traceability tool to win customers' trust. I am thinking probably we will also apply WeChat payment or Ali pay (a Chinese version of Paypal) into the traceability system in the future.

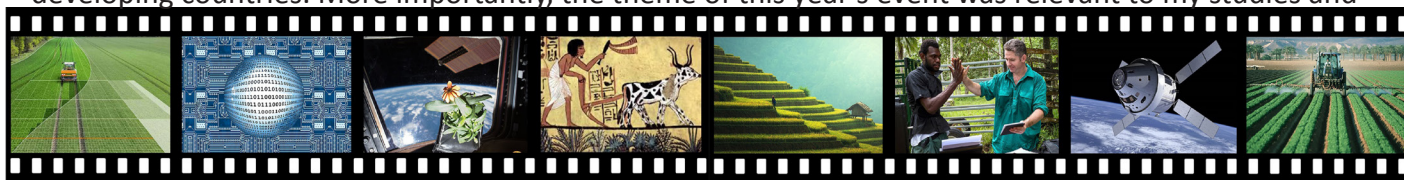
I was attending few Big Data Conference in Beijing before studying in Australia. It is normal to locate customer's needs through Big Data network, particularly in online social media, but hardly in agriculture. Interestingly, ACIAR has a lot of research programs on mobile technologies in the agricultural sector. Scientists design an easy understand application and teach farmers to record their farm data in different languages. Dr David McGill even analyse genetics and epidemiology through mobile technologies. I had been thinking of developing an application in animal production, but investors always asked me where the profitability is, and if smallholders are able to use this app on a daily basis. After the exposure of mobile technologies especially research projects that ACIAR have been done in developing countries, I am surprised that farmers' education level are not lower as we thought, and the mobile phone is quite popular all over the world. Each farmer may even have one or two phones on their hands. It's quite fascinating that we could have this technology on farms, and the big numbers of farmer users will make this investment profit eventually.

Aside from all the interesting and useful research ideas, the Crawford Fund network events kept surprising me from the first night. All my roommates work for different organisations in different regions. It's a good chance to hear all of them, to share their work experience, and give me a better view of this industry. I've never attended such an event that offers students so many social opportunities. I got a chance to talk to excellent scholars from different areas and well-known researchers also loved sharing their past experiences with me. I also developed a good friendship from this event. She is studying the same major as me in the University of Melbourne and we've never met before.

I am so glad I attended 2017 Crawford Conference and believe that the knowledge I acquired would be beneficial in my future career.

Joseph Macharia, *Queensland University of Technology*

I would like to acknowledge and thank the Crawford Fund administration for facilitating my attendance at the conference in Canberra. It was eye-opening to see Australia's role in agricultural research in developing countries. More importantly, the theme of this year's event was relevant to my studies and



my current work.

By attending the conference I was able to network and engage with other students, researchers and professionals interested in agriculture in developing countries. Being a student from a developing country, who previously interacted with professionals who were implementing development projects from an NGO perspective, rarely did I have the opportunity to interact with scholars from other countries (such as Australia) who were researching agricultural issues for the benefit of developing countries.

One outstanding observation was the atmosphere the mentors and senior researchers provided. They were approachable, keen to listen, supportive and very interested in feedback and follow-up. In particular, the ACIAR board members were very helpful.

Given my research interest in the conference theme, I was keen on the discussions and presentations, especially how I would apply them in my studies and online for a small-scale digital farmer's marketplace. Of interest, was the importance of data and whether data should be commercialised or be provided free. Although it is still debatable, access and relevancy of data in decision-making was highlighted and I concurred with the speaker who suggested that the agricultural data should be free.

The second highlight was how technologies can be used to attract the youth and new generation of farmers. Considering that the young generation is adopting technology in other domains, for instance social media, in the same way technology such as drones can be used by the young generation of farmers in farm operations. The conference reinforced my view that engagement and interaction of various partners in agriculture through public private partnership is necessary if digital technologies are to transform the agriculture sector.

Although my research is on digital technologies, it was of concern to note that agriculture is the least digitised industrial sector. This provides an opportunity to explore, meaning my area of expertise is relevant and important now and in the future.

In conclusion, my attendance and participation in this year's conference was of great value both to my studies and in realising the contribution I can make to rural development in Kenya. I would recommend the Crawford Fund Annual Conference to others since it's a great opportunity for upcoming scholars in agriculture.

Thanks to all those who were involved in enabling my stay and participation in the conference, much appreciated.

Salman Sarwar, *The University of Queensland*

Surviving a long PhD journey needs motivation, and listening to and interacting with gurus provides you much needed steroid dose against procrastination. I think it was timely for me to attend this year's Crawford Fund conference, which was nicely sandwiched between the inspirational evening Sir John Crawford Memorial Address and the Mobile Acquired Data (MAD) Showcase.

Dr Lindiwe Sibanda from Alliance for Green Revolution in Africa gave an inspirational Sir John Crawford Memorial address titled 'A New Narrative for Ending Hunger'. Lindiwe not only shared an African perspective to food security but also a very personal family experience, highlighting the importance of agriculture and agricultural development in the lives of real people.

The main conference day started with an interesting introduction by the Former Deputy Prime Minister and Chair of The Crawford Fund, and a similar one about agricultural development by Minister Joyce in his opening address. During the day I learnt about the practical application of different technologies that can bring digital revolution in agriculture, particularly with a focus on enhancing food security and transforming livelihoods. The common use of hand held devices coupled with easy access to internet has immense potential of bringing latest information and smart agricultural technologies to the smallholders.

Research on use of on-farm digital technology in agriculture at University of Sydney seems to be promising for replicability in smallholder agriculture. Professor Salah Sukkariieh shared the advancements



of low-cost and easy to use technologies for improved agricultural, which I think will also attract younger generations towards the agricultural sector. Further, precise agriculture will contribute towards promoting climate smart agricultural practices.

The day ended with very interesting presentation by Dr Andy Jarvis, who works for the International Centre for Tropical Agriculture (CIAT) and Research Program for Climate Change, Agriculture and Food Security of Consultative Group on International Agricultural Research (CGIAR). Although he was the last to present his interactive presentation brought in refreshing ideas regarding research and development on digitisation of agricultural systems with a focus on developing countries. I liked his very honest point of view about data collection in agriculture i.e. the trend of mining data from farmers without providing them any information in return, however there is a realisation among research community about better feedback practices.

I really appreciate the approach being adopted by Global Open Data for Agriculture and Nutrition (GODAN) for open access of big data, which can contribute transform livelihoods of smallholder farmers. It was interesting to listen to the realisation among research community about importance and need of openly sharing the data about agriculture and nutrition with all stakeholders, making it available, accessible and usable.

The best thing, and rather quite unique one, in this conference was the idea of mentorship. I was lucky to have Peter Horne as my mentor, who holds the portfolio of General Manager, Country Programs at the Australian Centre for International Agricultural Research (ACIAR). I liked this idea a lot, as this not only provided a focused and quick learning environment but also the opportunity of networking through your mentor.

CENTRAL QUEENSLAND UNIVERSITY (CQU)

Kirt Hainzer, *Central Queensland University*

The Crawford Fund Conference provided a unique platform to network with both early and late career research and professionals working on a broad range of agricultural issues facing both Australia and the international community. I was able to connect with a number of individuals working both within my own research space, as well as individuals working on issues I knew very little about, which provided me with broader understanding of how researchers are addressing the multiple issues facing agriculture.

I was incredibly fortunate enough to have a mentor with an incredible understanding of the parliamentary process, and from our discussions I was able to understand the recent Australian political landscape from a truly unique perspective. Furthermore, my informal discussion with John Anderson also provided invaluable insights into the political decision making process and the current state of politics in Australia. The informal discussions I had with a number of extremely accomplished individuals were a highlight of my time in Canberra. The Crawford Fund has done an amazing job making the connections between late and early career professionals occur in such a seamless manner.

The data revolution may still be a long way from having a major impact in smallholders, but the presentations throughout the second day at Parliament House provided an invaluable insight into where data is taking conventional agriculture in developed countries. Personally, I gained a lot from the presentation and responses to audience questions from Dr Mario Herrero; I gained an invaluable understanding of genetic diversity from Dr Ken Street; and Professor Salah Sukkarieh's presentation on robotics was equally enlightening.

The RAID network event and scholar day provided something which if I was a younger scholar, would have been invaluable. Many of the RAID-ers provided first hand practical advice on getting work overseas and the realities of that experience. After speaking to other scholars they found the RAID events were helpful in understanding the ways of translating research interests from the local stage to the solving global issues.



Julie-Ann Malan, Central Queensland University

The 2017 Crawford Fund conference “Transforming lives and livelihoods: The Digital Revolution in Agriculture” was held in Canberra from the 7-9 August and focused on addressing global food security through the use of digital technology.

What insights did I gain from this experience?

- A better insight into the complexity of the agricultural discipline, current issues facing global food security and the need for collaborative research and data sharing across disciplines. Global problems need global solutions.
- Networking with sponsors and scholars.
- I was able to talk directly with keynote speakers at the networking dinner.
- Realising that my current research project will have the ability to make a difference and that technology will play a key part in future research.
- Attending Parliament House and being able to see our Parliamentary Members in action.

On day one we had the opportunity to introduce ourselves and meet our mentors and other scholars, followed by a networking dinner and a brilliant address by Dr Lindiwe Majele Sibanda. I was naturally drawn to Dr Sibanda not only for the inspirational way she told her story about growing up on her family farm in Zimbabwe, but because I too am originally from the southern region of Africa. I managed to talk with Dr Sibanda after her address – we talked about agriculture and nutrition, reducing consumer waste and the need to add sustainability to the agenda. I met a fellow scholar from Uganda who wants to follow my research on off-stream watering points for riparian protection as Ugandan farmers have installed watering points away from streams, but for unknown reasons the cattle aren’t using them.

On day two we attended Parliament House to listen to a range of speakers. Initially the conference focused strongly on economics, marketing and how we can use data collection to increase yield production and profit, particularly in developing countries using digital technologies. The conversation turned when Dr Herrero, Chief Research Scientist from CSIRO, asked pertinent questions, including “Are we farming to meet our sustainable goals?” and “Is increasing our production sustainable for our planet?” These questions resonated strongly with me as an environmental scientist. We need to consider not only production and economics, but also social, cultural and environmental values if we are to move forward.

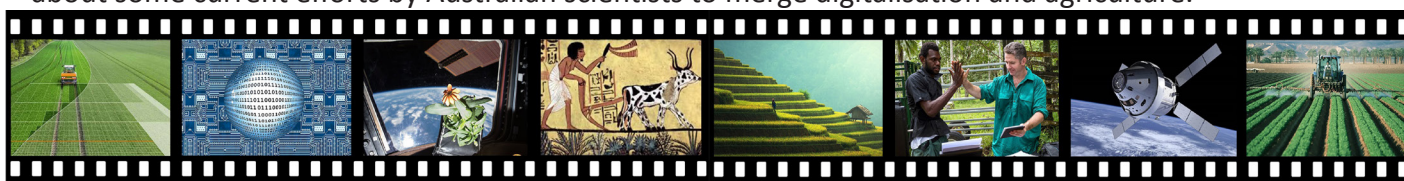
I found this conference to be informative, exciting, intense, fun and an eye-opener about what is happening in the world. I would love to attend again in the future and I would definitely recommend that my peers attend this conference as well.

Paramullage (Upamali) Sandaruwan Peiris, Central Queensland University

I was refreshed and enthusiastic to be back on the research track after inspirational talks of eminent scientists in the field of agriculture. The conference was organised around the theme of the digital revolution in agriculture. All the stories in conference really touched my mind and opened new thinking of research.

As I am come from Sri Lanka, there was a lot to get from the conference to apply in future. Especially case studies in Vietnam and other developing countries awakened me to addressing issues of smaller scale farmers. I was extremely inspired by Dr Lindiwe Sibanda’s John Crawford memorial speech. She nicely gathered the audience to a true life story about how African family based agriculture led to nutritious diets and she highlighted the importance of a diverse diet rather than focusing only on calories.

The Crawford Scholar days and conference provided every one with a fantastic opportunity to learn about some current efforts by Australian scientists to merge digitalisation and agriculture.



The case studies nicely explained how a little mobile phone could connect farmers with extension services, markets and peer groups. This is really applicable for my country where the digitalisation of agriculture for farmers remains at very poor levels.

The other important information highlighted in the conference speeches were big data sharing. The research is taking place all around the world however only a small amount of important data is accessible for the farmers to use in the industry. This was highlighted by Dr André Laperrière.

Furthermore, the RAID network event and scholar days provided awesome opportunities to meet people doing diverse research in the field of agriculture. This allowed us to mingle with people with similar research interests working in different countries and this created a cluster of people attached together on Twitter, Facebook for future data and knowledge sharing.

The networking dinner was a remarkable night to meet delegates from different institutes and also from different countries. Both formal and relaxed talks made us more free and attentive.

This was an opportunity to understand chances for volunteering and accessing funds from ACIAR. I appreciated seeing the previous works done by scholars and volunteers in the developing countries for global agricultural production.

The arrangement of an individual mentor for each scholar was really useful. It was worthwhile not only for the Conference but for future network building in regards to common research interests. My mentor encouraged me for the future research and helped to mingle with the people in the same area of research.

My sincere thanks goes to the Central Queensland University for funding support, and organisers and the members of the Crawford Fund for this incredible experience I gained during last few days. It was really amazing and very well organised. I will surely encourage my colleagues to attend the upcoming Conferences and I also wish to attend future conferences. Finally, I believe that the Crawford Fund conference has answered some burning questions for me.

DEAKIN UNIVERSITY

David Giles, Deakin University

I was grateful for the opportunity to attend the 2017 Crawford Fund Conference. I learned a great deal in a short space of time and met a range of generous and committed interlocutors. However, the conference also left me with strong misgivings about crucial omissions.

The conference appealed to a range of my interests. While my work does not deal with agriculture directly, it considers food systems and food security holistically, and therefore all aspects of food-related value chains are of interest to me. In many ways, the conference's speakers represent an intellectual community parallel to the food studies scholars, political economists, and urban agriculturalists with whom my work is in dialogue. It was gratifying to meet a wide range of people with expertise different to mine, but with parallel commitments and concerns about food security and environmental change. I was particularly glad to hear from scholars like Dr Lindiwe Sibanda, whose keynote address was the highlight. I was most excited about meeting Crawford Scholars from beyond Australia. The breadth of experience represented at the conference was inspiring.

However, I am not convinced that the conference adequately represents that breadth of experience and knowledge. With a few exceptions the panellists seemed to represent a narrow consensus focussed on technological and market-centric approaches to food security. The conference speakers made no reference to global indigenous perspectives, "food sovereignty", land reform, permaculture, or empirical critiques of market-centric and technocentric development projects. (Indeed, I was surprised to see the phrase "green revolution" used uncritically despite the scholarship criticising its assumptions and effects.) All of these represent serious, necessary contributions to any conversation about food security that were overlooked. Indeed, it is telling that "food security" was a phrase I heard spoken no more than



two or three times during the entire conference (aside from Dr Sibanda's brilliant keynote address).

By far, the word "development" was spoken more often. The notion however entails a singular, ethnocentric set of optics that tends to obscure and marginalise a diverse array of peoples and traditions. As such, with the exception of two speakers the overwhelming impression given was of "research for development" as a unidirectional transmission of expertise from western, "developed" nations to non-western "developing" nations, with little explicit acknowledgement of the specific concerns of local farmers, or of the value of traditional lifeways, foodways, or traditional environmental knowledge. In a similar vein, only two panellists made mention of potential conflicts of interest between development projects and indigenous peoples. It is telling that Sibanda's critique of the loss of traditional knowledge and local biodiversity was largely ignored in subsequent conversations. Reflecting this western-centric focus, the majority of speakers were white, anglophone citizens of developing countries. Indeed, Crawford Scholars from post-colonial nations confided in me that they saw parallels between disparities in representation at the conference and the imposition of western "expertise" during the colonial era.

Some of these disparities are beyond the control of conference organisers, of course. For this reason, as a corrective, it seems all the more imperative for any organisation concerned with food security to be deliberate about creating spaces to facilitate collaboration and across numerous perspectives and stakeholders. In future conferences, it is my strong suggestion that a broader range of perspectives are represented, including representatives of global indigenous communities, farmers' organisations in the Global South, organisations dedicated to "food sovereignty", and researchers who offer empirical critiques of development projects. While these critical voices were not present, it was disquieting to note that among the voices who were represented was Bayer—a corporation which has recently acquired Monsanto. The critiques of Monsanto's business practices and environmental practices are, of course, well known. The fact that a company like Bayer was included at a conference about food security while so many other perspectives were not reflects a disparity which I urge the Crawford Fund to address.

I remain excited by the commitment that animates the Crawford Fund Conference, and I have profound respect for the impulse to build international relationships with the goal of knowledge sharing. I share this vision, and I urge the Crawford Fund to more deliberately prioritise indigenous peoples, farmers' organisations, food sovereignty, and critiques of development. The synthesis of development and critique is crucial to securing the food systems of the twenty-first century.

Victoria Stead, Deakin University

My interest in attending the Crawford Fund conference, and associated scholar program, was as a social scientist (and specifically, an anthropologist) working in areas related to food security, land use, and the social and cultural dimensions of land and food resources. I am interested in the possibilities for dialogue between the social and natural sciences. Having worked with food producers and communities in developing contexts (Papua New Guinea, Timor-Leste) as well as in Australia over the past ten years, I am keenly aware of the gaps that exist between the social and natural sciences, as well as the challenges (practical, intellectual, methodological) to productively bringing these approaches into conversation and collaborative exchange.

Thus situated, the key benefits of my attendance at the conference were, firstly, the insights it gave me into key debates and themes within the agricultural research arena, and secondly, the opportunity to get a feel for a different research and policy environment to that which I normally participate in.

The key themes emergent from the conference included the shifting conceptualisations of food security. This was articulated, particularly, in Dr Lindiwe Majele Sibanda's eloquent keynote address. In mapping the shifting definition of 'food security' from one focused on calorific input to one encompassing nutritional quality, Dr Sibanda's account of her own life and family experience also included a call to recognise the social and cultural dimensions of food production and consumption. These include the ways that small-holder, diversified plots can sustain kinship connections as well as the health and



wellbeing of family members, and likewise the unintended negative social effects that can result from ‘developments’ that focus only on technological or limited scientific indicators of production or health. In this way, there was an interesting parallel between the message of Dr Sibanda’s talk, and the calls of South American and other Global South farmer-based movements, such as La Via Campesina and the Slow Food Movement – to think in terms of food sovereignty rather than food security. It was notable that there was no discussion of food sovereignty at the conference, and also very little engagement at all with the particular issues and concerns related to the effects of food production on Indigenous people (I noted just one reference, in the presentation by Prof. Salah Sukkarieh on farm robotics). These would be areas that the conference might usefully engage in subsequent years.

A key message from the global food sovereignty movement has been that we must pay attention to issues of justice, self-determination, power and politics, in thinking about the future and sustainability of food systems. Thus, for example, people should have a right not simply to sufficient calorific intake (or indeed, simply to an adequate nutritional profile), but to foods and food systems that are culturally relevant and enriching, that are ecologically sustainable, and that empower local people and communities. Paying attention to food justice also involves paying attention to issues of food waste, distribution, and the inequalities of access to food and control over its production. It was interesting that while these issues were sometimes raised from the floor, they were largely (with some exceptions, such as Dr Sibanda’s talk), absent from the panel presentations themselves. There was an assumption, and often an explicit assertion, that what is needed to achieve food security is ‘more food, produced more intensively’. Paying attention to political economy, history, anthropology, and development studies, however, also tells us that often what we need is better use and more equitable distribution of the food we already have.

The agriculture for development space is, as many delegates and speakers noted, transforming. This was evident in the differing perspectives that many presenters brought to bear, and it was particularly evident in the high level of representation at the conference from corporations and private, for-profit interests. Perhaps, as the Crawford Fund continues its important work of advocacy and dialogue, there might be space to expand the possibilities for exchange between the social and natural sciences, and to also include more explicitly the voices of Indigenous people, social movements, and food justice activists.

ELANCO ANIMAL HEALTH

Elsa Glanville, *Mackinnon Project, University of Melbourne*

“Being a jack-of-all trades and master of one will help in the pursuit of a food secure future.”

Attending the 2017 Crawford Fund Conference, and associated scholar activities, provided a fantastic opportunity for networking, mentoring and thought provoking discussion. I am incredibly grateful to the conference organising committee and the sponsors for providing this opportunity. The benefits of participating range from the more personal, forming friendships and mentoring relationships, to the more professional, connecting with potential future colleagues and collaborators. The dinner preceding the conference, and the break times during the conference, offered us scholars the chance to participate in conversations with others with similar interests from an array of professional pursuits across the full spectrum of experience. Personally, I felt welcomed into this diverse community of individuals so clearly interested in improving the lives of others through a commitment to developing agriculture, whether via an anthropological or geophysical perspective. The introduction to this community encourages me that we can work toward a future where research groups and projects collaborate through interdisciplinary teams rather than silos. Attending the Crawford Fund Conference has encouraged us to continue to develop into ‘T’ shaped people, able to help this world by developing into an adaptable jack-of-all trades and master of one.

Interestingly, two common discussion topics featured in the conversations had with other scholars over the three days. The first surrounded the desire to remove the tendency to think, and act, in silos. The second was the belief that including gender and socio-cultural issues in the discussion around



agricultural development is essential for progress toward a food secure world. Throughout the scholars' days and in listening to the questions from the audience throughout the conference, I was struck by the number of enthusiastic, articulate and intelligent individuals passionate about shaping the future. The questions raised included concerns over data security, sensitivity to gender and culture, accessibility of data and the practicality of technologies. I greatly appreciated the speaker's attempts to earnestly approach each of these questions.

The potential for digital technology to improve food production both directly and indirectly, and the importance of food, environmental and nutritional security was emphasised throughout the conference. The speakers eloquently described how the use of 'big-data' and digital technology can help improve agricultural productivity and thereby the quantity and/or quality of food production. From the ensuing discussion, my take home message was that we must ensure that environmental, nutritional, social and health security are not compromised in the process. The conference program made me think about how important the latter two, social and health security, are to the afore-mentioned trio of food, environment and nutrition. Adding socio-cultural and health (animal, plant and human) to that trio forms a functional five part Venn diagram of interrelated needs of similar importance. Dr Lindiwe Majele Sibanda, the jewel in the crown of the conference, inspired these conclusions. Her impressive oration delivered an impassioned plea for the importance of nutrition sensitive agriculture, for instilling youth with a passion for agriculture that elevates it from an essential to a potential for the entrepreneurial and for following your dreams independent of the perceptions of those around you, and the doubts within.

Natalie Hoskins, Western Sydney University

The Crawford Fund is a conference I've had my eye on for three years now, since my first year of undergraduate studies when I missed the opportunity to attend with my university by mere hours. Finally, this year as a third year double degree undergraduate student, I decided to take the plunge and apply through the Crawford Fund for a scholarship. Private animal health company, Elanco, offered to cover the costs associated with attending the conference and I was ecstatic; I counted down the days and had my outfits picked a week before!

As I started speaking to people when I arrived at the first scholars day, I felt instantly underqualified – I'm merely an undergraduate student with no research under my belt who's never been to Western Australia, let alone overseas to see how agriculture is done there! I knew I was faced with two choices – give up and go home, or accept that I'm just earlier in my career path than everyone else and utilise their knowledge of the industry to assist myself in setting my own goals and directing my future.

That's what I did. I took the opportunity to speak to everyone who had even the faintest of a similar interest with me and I picked their brains. I asked about their undergraduate course and their postgraduate path; I asked about their current research; I asked for advice. Since returning to Sydney, I've begun to arrange some research assistant opportunities to get experience in the field, begun to read more widely, and joined the Society for Reproductive Biology and the Australian Society for Animal Production. I consider the networking interactions I had with older students and researchers to be the most valuable component of the week for me.

This year's conference theme was digital technology within the developing world. As a lucky citizen of Australia I knew that our technology is rapidly developing and becoming more complex than even I'm able to comprehend. But what is it like in other countries? Countries that still work with pen and paper? Who is taking the time to develop technology for countries that are decades behind our own? And most importantly... Is it working? The simple answer is "Yes". The long answer is that there is much to consider – is it easily usable for someone who's never owned such technology before? Is it cost effective? Is it compatible with the language they speak? This conference made my mind buzz with questions for three whole days!

Dr Lindiwe Majele Sibanda, the presenter of the 2017 Sir John Crawford Memorial Address was a truly enlightening and encouraging character for me, and her memorial address was thought provoking.



Although she originates from a very different place and time from myself, she shares a similar field interest, and has become incredibly successful in said field, not because she had to, but because she wanted to. I was encouraged by her idea of rewriting the agriculture narrative to not simply say “we need to make more food,” but to be a more nutritious one; quality over quantity.

I cannot begin to thank Elanco representative, Jessica Ramsden, for the time she spent talking to me and encouraging me throughout the conference. I’d also like to thank Dr Helen Scott-Orr, my mentor for the duration of the conference. The conversations I had were insightful and I feel more confident for having had them.

FIFTH ESTATE

Timothy Mort, *Fifth Estate*

The 2017 Crawford conference and associated scholar days were a fantastic opportunity for me to broaden my horizons, learn more about international agriculture, and also develop my networking skills. I am very thankful to my employer, The Fifth Estate, for giving me the opportunity to attend, but also the conference organisers for providing such a great collection of people, content and ideas.

Reflecting on the conference, I think there were a number of key messages and highlights which resonated with me. The first major message for me was that to well and truly solve the issue of food security and feed the world’s growing population, that we have to move away from the remaining amount of subsistence farming and move to a full production farming system globally. While developed countries have mainly moved to full production systems, it is clearly the developing countries that still have the greatest potential for improvement.

In my opinion this will require greater effort in creating transparent, and fair markets for agricultural commodities, such that a financial value can be placed on growing a crop, and that farmers in developing countries can make a profitable enterprise out of their land. Making a profit is key as it has many consequential effects. These include creating the ability to pay for their children’s education (thus helping alleviate poverty), the ability to re-invest into their farm (to increase production and grow their business), and also the ability to make farming a respectable career choice rather than just a way to feed your family.

The second major message for me was about technology and how it can best play an increasing role in farming, especially in developing countries. Having followed the evolution of farming technology in Australia, I am of the opinion that successful technologies must achieve one of two outcomes, that being to either increase profits, or decrease costs. However, as seen in other industries, there is often a number of technologies developed that on the surface seem like they are handy tools, but fail to provide a real value proposition to the farmer. Thus I think that emphasis must be placed on technologies to achieve either of the two outcomes. For example, an increase in profits could be achieved by an improved yield or quality, while a decrease in costs could be achieved through a lower labour cost, or less chemical input costs. Consequently I think that technologies aimed at farmers in developing countries must also achieve one of these outcomes, otherwise they too will fail in the long term.

While these two key messages were a subset of many takeaways for me, they were the ones that resonated with me the most, especially considering my private enterprise background. I would like to take this opportunity to again thank the organisers of the Crawford conference, and especially Cathy Reade for making it an interesting, well-organised and valuable event for me to attend. I look forward to following the Fund’s future work, and am pleased to commend their cause as one that has a real purpose and is evidently having an impact.



GRAHAM CENTRE FOR AGRICULTURAL INNOVATION, CHARLES STURT UNIVERSITY

Arundhita Bhanjdeo, *Graham Centre for Agricultural Innovation, Charles Sturt University*

Attending the Crawford Fund Conference as a scholar was a very enriching experience for me. It put forth so many diverse popular as well as emerging perspectives on digital revolution in the sphere of agriculture. I believe the best part of the conference was to be able to meet people working in the same field and share and learn from them about their work and experiences. Even more amazing is the fact that I can stay in touch with them, share each other's work and keep enriching our work or study areas, PhD currently for me, personally and hopefully later also.

It was interesting to see how people from different age groups, countries and even different interest but parallel goals could be in one common space and interact. I think if not for such a platform, I would be apprehensive to approach so many experienced people. I got to personally meet so many people, with so much of an expertise in the field of agriculture and get insights from them, thanks to the scholar-mentor linkage program.

The parliamentary conference too was full of enthralling and informative talks. The quality of the presentations as well as the speakers were excellent. For me personally, one of the most attractive and inspiring parts of the conference was the talk given by Dr Lindiwe Sibanda. The effortless way in which she put forward her not-so-easy journey of life and linked it with the present global concerns in the sphere of agriculture and nutrition was just magnificent and thought-provoking. Listening to her that whole hour was motivating of the spiritual kind. I have returned to my office with greater enthusiasm and conviction.

The facilitation of the scholar day was very impressive and it provided a great opportunity to have short discussions with a number of researchers.

The conference gave me an opportunity to be a part of the RAID network, which I think is a useful platform for early career researchers to learn and access a lot of relevant insights, knowledge and opportunities. Especially for me, doing a PhD in Australia with my study area in India with smallholder farmers, it was wonderful to become aware of the enormity of academics and researchers working with smallholders all over Asia and to know of the challenges, uncertainties, high or low point they face. It reassured me that the sporadic uncertainty that I face in my research is only normal and that I should come out of that with greater energy.

In a nutshell, the whole conference added enormously to my professional and research network and I am thankful to the Graham Centre for providing me with this opportunity. I hope next time the conference also has some policy level discussions and some more perspectives from the field as I think these are the two ends which is essential for us researchers to link, connect and work with. I look forth to staying connected with all those who I met at the conference and would also love to attend the conference next year, if the topic is of interest to my research.

Cara Wilson, *Graham Centre for Agricultural Innovation, Charles Sturt University*

Attending the 2017 Crawford Fund conference gave me so much more than I could have ever expected. I had initially thought it was just the conference theme 'Transforming Lives and Livelihoods: The Digital Revolution in Agriculture' that was relevant and of interest to me but this conference opened so many doors for me that I was not even aware of.

I was so inspired by many of the people in attendance – particularly Dr Lindiwe Majele Sibanda. Her talk on the opening night encouraged people to think outside the box of 'higher yields' and emphasised that nutritional diversity is extremely important. The idea that we need to incorporate nutrition in with our agricultural ways rather than just producing more food (and subsequently wasting it) was one that makes so much sense yet is not something we readily think about. The answer to overcoming this is to collaborate with the health community and develop agricultural frameworks that involve nutrition as the central idea.



I benefited from so many of the talks, especially Dr André Laperrière who presented on big data for small-holder farmers and how it can change their lives and livelihoods. He explained that data collection is a two-way street. When farmers provide data it builds on the knowledge bank which in turn provides farmers with management advice. Communication between our researchers and farmers and subsequently the public is something that is becoming increasingly important.

The link between research to its development and application in the field is something that I have not seen much in my career so far and I saw it readily at the conference. The notion that whatever research we do in agriculture, we are all working towards the same goal of food security, is one I think many of us either forget or had not even thought of.

This is one of the best conferences I have ever been to in terms of networking. The exposure to such a diverse range of people including other students, early career researchers, academics, researchers and industry was fantastic. The opportunity to be involved in the scholar day and be paired up with a mentor was fantastic and I hope to see more programs like this in the future. I particularly enjoyed the workshop style sessions at the scholar days which allowed for open communication between people.

The sessions presented at the conference provoked me to think about how my research can impact the agricultural industry both in Australia and overseas – whether it be a technique I use or my overall results. My work involves large amounts of data collected from abattoirs and the use of this data and its dissemination to researchers like myself as well as the farmer has become of increasing interest to me. The Crawford Fund Conference encouraged me to think about how this could be applied outside of Australia and I am excited to think about how we can collect useful data that can provide information to multiple parties.

I now have a renewed perception on agricultural research and my PhD.

MARCUS OLDHAM

James Hawkins, *Marcus Oldham*

It was an incredible privilege to be provided a Crawford Fund Scholarship care of Marcus Oldham College and Crawford Fund to attend the 2017 Crawford Fund Conference in Canberra earlier in the year. With such a relevant topic “Transforming Lives and Livelihoods: the Digital Revolution in Agriculture” it would have been a real shame to miss this event. Having been bought up on the land and having ran agricultural businesses for over ten years I am acutely aware of the importance of technology and software in the Australian agricultural landscape especially due to the relatively unique issue of high labour costs for Australian producers. It was incredible to see that a lot of the technologies being developed or used in the Australian industry can transfer across into assisting developing countries with some of the challenges in their primary production systems.

While the conference itself was an incredible experience there was so much more that this experience provided from the learnings from the other scholars, the way it encourages people to converse with as many people as possible to the exposure to parliament house. I would like to express my gratitude to Terry Enright my mentor for being a beacon of contribution and intelligence and providing wise counsel. I learnt a huge amount from being around Terry and the other experienced Crawford Fund associates and believe this is a hugely beneficial part of the experience.

The Crawford Fund Conference experience provided an insight into some of the great leaders which have been in and around both primary production, development and also public services and public life. Being exposed to such leaders like John Anderson and Tim Fischer among many others provided a great benchmark for how to charm crowds and carry important messages and I will forever use these people as inspiration for what is possible in leadership.

The conference itself provided someone with little experience in development like myself an insight into the powerful and selfless work being carried out by young Australians in Agriculture in developing countries. The work which is being done with ACIAR and associated organisations is clearly providing



much needed contributions to the areas in which they work. The works being done in these countries appears to also contribute to the Australian agricultural and science industries through helping to develop young people into resilient, confident and capable individuals.

The key note speaker Dr Lindiwe Majele Sibanda provided a fantastic perspective from an incredibly intelligent woman with such a deeply person connection to development and issues facing some of these populations. The fact that the term “food security” needs to be viewed as a wider context beyond food supply and that there needs to be a focus on informing policy makers and educating populations to ensure populations are properly nourished. I am incredibly inspired by the messages and learnings I was lucky enough to get from the Crawford Fund Conference and hope that in my own research into soil science can aid in increasing agricultural productivity into the future.

Jennifer Scott, Marcus Oldham

With the inspiring mission “For a food secure world” and a 2017 theme of “Transforming Lives and Livelihoods: The Digital Revolution in Agriculture” the 2017 Crawford Fund conference promised to be transformative in building my knowledge and understanding of digital agriculture and food security.

As a student in the Marcus Oldham Postgraduate program; I was fortunate to be selected as a scholarship recipient to attend the scholar program and conference. I would like to thank Marcus Oldham College and the Crawford Fund for this opportunity as well as the speakers who dedicated their time to this event and Tim Reeves who was my mentor for the event.

From the opening speech delivered by Barnaby Joyce to the keynote speech by Dr Lindiwe Sibanda; I found the speeches inspiring and insightful. Mario Herrero’s analysis from the CSIRO which demonstrated the average size of farms and production capacity of smallholder farms was particularly interesting as was Dr Andy Jarvis’s speech in regards to the digitisation of agriculture. Although I have specifically mentioned a number of speakers I learnt something new and interesting from every single person who spoke. The opportunity to discuss sustainable agriculture intensification with my mentor was really helpful in building my understanding of this field and I appreciated having the chance to network with RAID members and to learn more about their experiences and insights from working in international development.

It is clear that the rapid growth in digital technologies has helped to evolve new supply chains, geographical mapping capabilities and data analysis and this will continue to play a large role in building a hunger free world. Digital technologies will continue to evolve at a rapid pace and this is likely to disrupt food and agriculture industries more into the future. Already traditional supply chains are being challenged and the use of digital technologies in developing countries to overcome issues is inspiring.

There are a lot of different viewpoints about how we feed the world and it was important to be able to open my mind to understanding different opinions and viewpoints. I probably came away from the conference with more questions than answers but I feel that was one of the strengths of the diversity of speakers and scholars because it’s important to ask questions. I came away from the conference with a determination to focus on the data and to make decisions based on the science and to keep asking questions.

Ultimately, I came to understand that achieving a hunger free world is a huge and complex challenge and it requires the technology to do things differently in a world with a growing population and a changing climate. Equally, it requires passionate, connected people to collaborate to design new solutions to old problems and that is what the Crawford Fund achieves by bringing together people with diverse backgrounds and interests.

Thank you for the opportunity to attend this event, to meet with like-minded people, to learn and to start asking questions.



TASMANIAN INSTITUTE OF AGRICULTURE, UNIVERSITY OF TASMANIA

Tahseen Zeb, *Tasmanian Institute of Agriculture, University of Tasmania*

I would start sharing my experience and exposure as a scholar participant in Crawford Conference with cordial thanks and a salute to the great Sir John Crawford. I don't know much about him but as much I know is enough to say that if we need a world with sustainable agriculture and long-term development we have to extend his vision and approach.

I came to Australia with a hope and determination that during my two years candidature I shall absorb all the knowledge and skills which I can and will deliver them back home. My vision is to transfer the latest technological and scientific knowledge that can benefit Pakistan's Agriculture system.

I would like to thank the Tasmanian Institute of Agriculture, School of Land and Food for sponsoring my dream. Secondly, the mentors were the bridge between the participants. It was really amazing to hear and see some of the concepts which I only had read about in articles. The speakers, professionals and scientists delivered very easy to understand and clear view about their expertise.

Among all sessions and presentations, I would like to mention few that matched my interests and future plans. As I worked on a large group of genotypes in my Masters, the uses and challenges of big data for agricultural development helped me to understand the logical and practical handling of big data, Moreover, it also provided some ideas that how can I best present my research work.

I picked that ICT application can uplift the rural agriculture systems. This will deliver systematic services and can help to improve nutrition and agriculture production in areas where farmers are less educated and deprived.

The use of software and new automatic farm machineries have always fascinated everybody. But along with this, its utility and effectiveness has also been admired by stakeholders at every level. The advancements have enabled the farmers to manage the crops with just a push of button. Now the physical effort is reduced and accuracy is increased, and production has also increased by timely management of farm practices. The sessions on digitalising agricultural systems in the developing world by Andy Jarvis held my attention and boosted my knowledge. Besides this, the introduction and detailed session about Mobile Acquired Data (MAD) also enabled me to generate an idea about how these could fit into the agriculture systems in Pakistan.

It was wonderful to meet and listen to people who were working in ACIAR and RAID, travelling extensively, and achieving their goals. Many of them have worked in Pakistan and it was amazing to see them highlighting the issues in Pakistan's agricultural sectors.

The support of Australian Awards in motivating young scientists and professional is encouraging and I shall be looking forward to getting benefit from this networking experience.

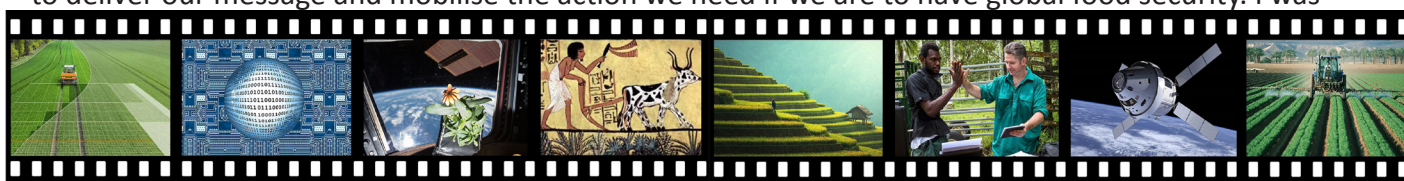
THE GARDINER FOUNDATION

Molly Voss, *The University of Melbourne*

I was fortunate to be sponsored by the Gardiner Dairy Foundation to attend the 2017 Crawford Conference. I feel extremely grateful for being given the opportunity as it was one of the most valuable and inspiring events I have attended as a Masters student for many reasons.

Hearing from experts and leading researchers about the digital agriculture revolution really captured my interest and exposed me to a depth of knowledge in such a short time. Particular presentations that inspired and challenged me to think differently included Dr Lindiwe Majele Sibanda's Sir John Crawford Memorial Address, A New Narrative for Ending Hunger; Salah Sukkarieh's presentation Mobile On-Farm Digital Technology for Smallholder Farmers and Ken Street's presentation Big Data for Genebank Mining.

Dr Sibanda's eloquent delivery reminded me the power and importance of communication in our field to deliver our message and mobilise the action we need if we are to have global food security. I was



mesmerised by the videos of digital farm hand at work presented by Professor Sukkarieh, whilst the use and capacity of a gene bank and big data was a new and exciting discovery for me.

One of the most valuable things I took away from the conference were my interactions with people; from the mentorship I received from Mike Taylor, the conversations with extremely experienced and passionate scientists and researchers, to being able to meet other young people with similar passions to my own. It was invaluable to be able to discuss people's journeys, challenges and optimism for the future of agriculture and the careers options in the industry.

A key message that I have taken away from this conference is to 'be a jack of all trades and a master of one'. It was clear that this advice held true when speaking with conference delegates, presenters and researchers and seeing how important having a multidisciplinary skill set is.

I wish to thank The Crawford Fund for putting together such a fantastic conference program and allowing me to attend.

Ruchika Perera, *The University of Melbourne*

This year, I was fortunate enough to participate to the "Crawford Fund Conference 2017" as a scholar funded by the Gardiner Foundation. I felt this conference as an invaluable opportunity to connect with established professionals in the various research disciplines, to search for what are the opportunities available locally and internationally for young scientists and to learn about the novel trends of agricultural development.

On the first day of the program, I joined with the other scholars from different parts of Australia representing various countries and research disciplines and had a chance to discuss their research interests which was a really good experience for me. In the evening sessions, we learnt from the experts' experiences, about the international and Australian opportunities available to develop our professional life and required skills and qualities to adapt to the challenging working environment. Dr Lindiwe shared the challenges she faced during her research and career life as a woman engaged in the agriculture sector. The key message from Prof Andrew Campbell to the scholars was "Be really good at what you are capable of and develop some other generic skills like team work, communication, leadership, networking and conflict management", because multinational companies are looking for people who can technically fit the job, but they are also looking for the capacity to grow, develop and be able to carry out other jobs in the organisation as well. In the next session, Dr Pham and Kylie shared their experiences in working in a developing country and emphasised the importance of developing relationships first with farmers before expanding the scientific boundaries in that environment.

The mentor program was a really helpful event throughout the conference that enhanced our confidence in meeting with reputed scientists and share our thoughts and research interests with them. Prof Lester Burgess emphasised that a mentor should be a wise trusted counselor who can build the capacity and confidence of young people and told the story of how a Vietnam fresh graduate who was very shy at first ended up with many scientific publications including a "Diagnostic manual for plant diseases in Vietnam". She had developed her communication skills, language skills and team work during her time with the mentor and now she trains the farmers to diagnose the plant diseases in Vietnam. I was really lucky to have Dr Rowen Smith as my mentor who introduced me not only experienced researchers in my area of research but other industry people who stretched my perspectives of the topics discussed in the conference.

The networking dinner paved the way to meet people in cross disciplines, get to know their interests, expertise and current work involvement in the agricultural development. Meeting and talking with these internationally recognised experts gave me a great opportunity to make connections which may lead to opportunities for collaboration in the future.

During the second day, we heard speeches of how can big data transform small holder farmer's lives and livelihoods by different angle by each speaker. Titled "Transforming lives and livelihoods: the Digital



revolution in Agriculture”, the conference talks focused on how the future research and policies should be directed towards reducing hunger and poverty in developing nations through digital agriculture such as ICT, mobile phones, satellite image processing, drones and cloud computing etc. Further, concerns such as cultural and traditional barriers, lack of knowledge on and access to the expensive devices were also discussed as these might be the possible obstacles in implementing these digitised technologies in the small holder farms in developing countries. Therefore, I realised that this technology will be well established in these societies with time through the generations. However, the potential of attracting younger generation to the agribusiness sector via digital data technology is an interesting trend that was highlighted.

My interest in the conference was mainly drawn to the talks that highlighted the importance of collecting normalised, reliable data; the need of balancing the data asymmetry; and, bringing all collected data into a common, interpretable, and actionable platform to be able to be used by farmers, policy makers and all parties who are benefited. It was also highlighted how to combine this information with the ecological indicators and the climate forecasts and projections using Meta models to generate the final forecast, because it is more valid to gather and incorporate data from every possible area linked to agriculture when making final decisions. Finally, many people had concerns in their minds as to how the environment will react to all these issues of climate change, land degradation due to intensive agriculture and deforestation. This point was raised especially because without understanding the ecosystem services and their interactions with humans and animals, incorporating technology might result in unexpected issues.

All in all, Crawford Conference 2017 was an unforgettable experience in my student life. As an agriculture student, I have been familiarised with the tropical agricultural systems in my country (Sri Lanka), but this conference expand my horizons to explore how other countries in the world look at the issue of food security and poverty elimination from different angles and apply novel innovative technology to reduce them. Therefore, I must congratulate and thank The Crawford Fund organising committee, RAID network, ACIAR, and the Gardiner Foundation for organising this fantastic event and giving me this great opportunity.

UNIVERSITY OF MELBOURNE

Cecilia Cameron, *The University of Melbourne*

Taking part in the Crawford Conference this year was an eye-opening experience. The conference topic, how big data can contribute to providing international food security, is a fascinating topic and being immersed with people passionate about it really expanded my understanding of international agriculture and the use of technology. There were a lot of topics and areas explored over the two days, from seed banks, to small holder farmers, to the use of apps in research, to data sharing. A few of the speakers’ that resonated most deeply with me included Dr Ken Street’s exploration of the FIG strategy, Dr Mario Herrero’s depiction of the distribution of farmers across the globe, Dr André Laperrière’s discussion on open data and Dr Lindiwe Majele Sibanda’s inspiring discussion on the changing face of agriculture in Africa.

Introduced by Dr Lindiwe, the concept of providing nutritional security and nutritionally sensitive agriculture, was a key take away from the conference. The idea led to many discussions around different ways this is possible; from a supply chain perspective, to improved genetics, revolutionised pricing pay strategies and, of course, improved education. The different ways in which people discussed nutritional security acted as reminder as to how multifaceted the challenge of international food security is. I realised that there are many ways to skin a cat and even more ways to approach improved food security.

Professor Salah Sukkarieh’s presentation, “Digital Farmhand – data analytics and robotics for food and nutrition security”, was a fascinating display of how computer science will change the future of agricultural labour. It was great being a part of the scholar group where people had a variety of



backgrounds. After Professor Salah Sukkarieh's presentation I had an excellent in-depth discussion with an anthropologist about the social implications of projects like the robotic farmhand. It was discussions like this that reinforced to me how important it is to take a multidisciplinary approach to international food security.

Four big take aways from the conference included:

- Focusing on nutritionally sensitive agriculture
- To be a "Jack of all trades and a master of one"
- The low level of digitalisation being used in the agricultural sector and hence the opportunity for improvement
- The opportunity that smart phones, and their widespread use, has created for improved agricultural practices in developing nations

Additional to the quality of speakers, much of what I learnt from the conference came from discussion with other scholars, mentors and attendees. Discussing international food security and the development of agriculture made me consider in greater depth what my contribution to this challenge will be. This sparked greater motivation and has led me to spend two months of the summer volunteering in Malawi on an agricultural project. I am very grateful to the Crawford Fund and to the University of Melbourne's Faculty of Veterinary and Agricultural Science for giving me the opportunity to learn from leading researchers and meet with like-minded individuals. It was brilliant to be a part of the 2017 Crawford Fund Conference and I look forward to next year!

UNIVERSITY OF NEW ENGLAND

Thi Hiep Dao, *University of New England*

I was very lucky to be selected as a scholar of Crawford Fund Conference in 2017 with the title, "Transforming Lives and Livelihoods: The Digital Revolution in Agriculture". The conference was a great opportunity for me to know more about international agricultural research in Australia, to learn the new knowledge and socialise with people involving in the agricultural research in Australia.

In my home country, I have been working as a lecturer at the Faculty of Animal Science at Vietnam National University of Agriculture. Through the international cooperation research project, I had opportunities to work with researchers from France and Thailand. I recognised that international cooperation projects could bring many benefits for the researchers from both countries to share knowledge, work experience and to transfer new techniques in the agriculture sector. Australian agriculture in general and its animal production in particular has been developed extremely successfully. Thus, I always desire to develop the cooperation research with the research institutes/universities in Australia. The Crawford Fund Conference helped me to get closer to my dream.

During the conference program, I was introduced to many international agricultural research funded by the Australian Government, which are being implemented in developing countries in Africa and Asia. I was very happy to know that there are many of these projects underway in Vietnam (my home country). The findings of one research project funded by ACIAR were presented by Dr Pham Thi Sen - 'Farm level data for decision making, evaluation, traceability and quality assurance.' Food safety is a current problem in Vietnam and I think the project provided huge benefits to the development of a safe vegetable production sector in Vietnam as well as increasing its market opportunities. During the additional program for scholars and mentors, I also learned that ACIAR had a project on cattle production in the Centre region in Vietnam. The husbandry techniques from Australian researchers helped to shorten the reproduction cycle in cattle; therefore, increase the animal productivity and profit for the small-scale farmers in Vietnam. So, personally, I think international research projects funded by Australian government had brought many benefits to participating countries and those also help to build up a food secure world.



During the conference day, I listened to many presentations on how the digital revolution can transform agriculture. The agricultural sector is currently the lowest sector in applying digital innovation. So, digitalising agricultural systems will become important to increase the farm profit and it can be made possible through the mobile phone. The data from the presentations pointed out that small-scale farms are still predominate and therefore, play an important role in food production over the world. A presentation by Dr Andy Jarvis from the International Centre for Tropical Agriculture showed that the number of mobile phones in the world is more than the number of toilets. In some regions in Africa, farmers even have two mobile phones. So, applying digital advancements through the mobile phone system is possible for smallholder farmers. From the mobile phone, farmers can have updated information on market demand and can contact easily with the buyers or distributors. Thus, data revolution and digital application will bring huge benefits to the farmers.

Through the activities for scholars, I also met and talked with many new people from research organisations and other universities. It was a worthwhile experience for me to develop communication skills, learn the new things and importantly to build up my self-confidence. After the conference, I participated in a 3MT presentation competition at the University of New England and I think I did well because I did not feel nervous anymore. The activities between scholars and mentors were also very good for me to build the network, learn the new knowledge and have the new ideas, which is important to develop my career. In general, I benefited greatly from participating in the Crawford Fund Conference.

Zelalem L. Moti, *University of New England*

“We realised that we need to join hands to work towards achieving climate smart and nutrition sensitive agriculture.”

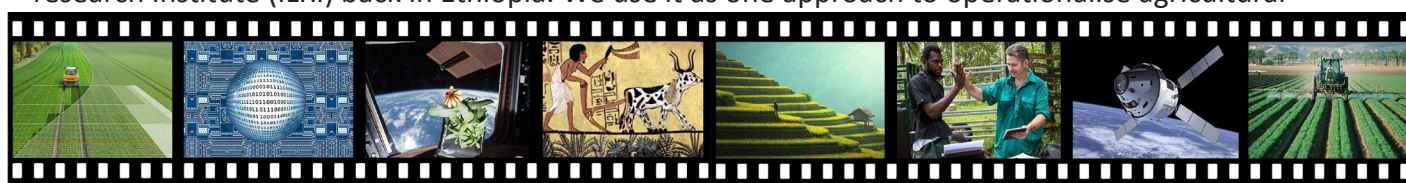
- Dr Lindiwe Sibanda

My participation in the Crawford Fund 2017 conference in Canberra gave me a great opportunity to learn from, and network with, the international agricultural research community. In addition to getting the right and positive answer to the central question of the conference which is having access to and better interpretation of data and information to improve agricultural productivity and profitability, the following are some of my key reflections.

First, having a mentor for young scholar like me was a wonderful family arrangement to learn from real stories and help create a real network for the future. For me it created a moment to learn critical issues related to the challenges and opportunities about smallholder farmers in developing countries. My mentor, Peter Wynn, Adjunct Professor of Animal Science, taught me about smallholders’ issues in Pakistan, for me who knows only about smallholders in Africa, by sharing his experience in a dairy project he was leading and he was involved in implementing. I also shared my little experience about working with multi-stakeholder arrangements called Innovation Platforms for smallholder’s development in Ethiopian highlands.

The second and most important part of the conference I found inspiring and touching was the talk given by Dr Lindiwe Sibanda about her grandmother’s farm that exactly explains what happened to the smallholder farms in Africa including in my country Ethiopia. It tells the story of how the African agriculture underperformed for the last couple of decades, the reasons behind this, and urges a rethink for scholars and all stakeholders to take actions to support smallholder farmers to achieve global food and nutrition security. My take home message from this talk was that it is time to re-think what we have been doing regarding food security and we need to go beyond increasing production and productivity and we have to achieve multiple goals at the same time – climate smart and nutrition sensitive smallholder agriculture.

Finally, one of my bigger expectation to participate in the conference was because of the terminology “Innovation Platforms” I have seen in the program. This term attracted my attention more than anything as I am familiar with the term and have been using it while I was working for International Livestock research Institute (ILRI) back in Ethiopia. We use it as one approach to operationalise agricultural



innovation systems which is a multi-stakeholder arrangement used as a space for prioritisation of constraints and identify opportunities at local level. Now I have broadened my knowledge and learned the different use of the term innovation platforms in different contexts at higher level.

UNIVERSITY OF THE SUNSHINE COAST

Ngoc Hoan Le, *University of the Sunshine Coast*

When the official conference came to a break, I took a selfie at the Theatrette and Mural Hall and posted to my Facebook page. This was the first of mine after more than ten years using social media.

My country of origin was named by several speakers in their presentations. I am from a less privileged nation that, although plays an increasingly higher role in the global community, constantly benefits from international collaboration. Either as a local in-country researcher or an international agricultural scientist, I am supposed to contribute to that transformative change. I have worked for more than 10 years in the agricultural sector and international cooperation has been an important part of my work. My current PhD in Australia is generously funded by DET's Endeavour scholarship, and people believe that I can do well, yet I always struggle to self-assure of my capability, even after being nominated as one of USC's Crawford Fund Scholars for 2017.

It was great that before the conference, a list of young scholars attending the conference was distributed. It made me comfortable to have someone, who is not at a too high level, to talk to at the convention of Australia's eminent agricultural scientists. But what I appreciated much is the concept mentor-scholar pairing. Yes, there would be someone with a wealth of experience who promised to take care of me and assist me in communication.

I started to overcome my diffidence at the first day when I felt the welcoming environment and went through the scholar program which was specifically designed for early career researchers. Dr Lindiwe Sibanda has been greatly impacting the world but her story did not make me think of something too far away from my arm reach. People from RAID have done an excellent job in organising scholar days; they themselves excellently demonstrated how younger, energetic people can actively engage in research life in Australia. Professor Lester Burgess, who is probably one of the biggest names in contemporary agricultural research, went into detail about how a beginner scientist in my country has been learning, growing personally, and contributing to a more food secure world.

I understood that to the CF2017 organisation board, motivating younger generation really matters.

I was also impressed learning how the "established" scientists were keen on talking to young scholars during both the scholar days and the official conference sessions. People I talked to were all willing to tell me about their work, to explain how the Aussie research system functions, and to hear about my study. This allowed me to gain more insights into the broader world surrounding my research focus, and more importantly this made me think I am part of the system.

It does not sound too special for someone to take a selfie, particularly when you are proud of your presence. But for me, I know the days in Canberra excited another part of myself: I belong to a network, and there is place for me to make contribution. At least, networking did not seem too difficult even when you were a humble introvert researcher.

Please send my thanks to Forest Industries Research Centre-USC for the scholarship; Dr Anthony Ringrose-Voase for his time as my mentor; and to CF2017 organisation people for the great opportunities.

Flavia Sarti Bonora, *University of the Sunshine Coast*

In August of 2017 I was one of the privileged students awarded with a scholarship to attend the Crawford Annual Conference in Canberra as a young scholar. This conference aims to address topics worthy of global and Australian attention and this year the focus was "Transforming Lives and Livelihoods: The Digital Revolution in Agriculture". The conference was an enriching experience, allowing me to be



involved with students and professionals working on different areas of agriculture and environment sharing their professional and personal experience.

The key message of the conference was the use of technology in data collection by smallholder farmers. The speakers managed to bring case studies from many parts of the world about the advantages of using technology to access and collect quantitative and qualitative data, which can help farmers to save time and easily access valuable information about crops, pests and pathogens control, trade and market of their productions, improve their knowledge and experience to make better decisions about their farms.

Moreover, innovative technologies were exposed such as multifunctional digital farmhand developed for small scale farm, capable of sample, evaluate, treat the crops, and Mobile Acquire Data (MAD) the using platforms for tablet devices and smartphones to help farmers to identify problems quickly with enough information to give them authority to make better decisions about their farms.

The constraints and challenges related to the use of technology for acquire data were also covered during the presentations, including data ownership, time requested for training, initial investment and problems with inadequate platform design.

I was personally interested by the case study about “Big Data for Genebank Mining” delivered by Dr Ken Street related to a new tool for rapid mining of agricultural genebanks called Focused Identification of Germplasm Strategy (FIGS). This topic can be related to my research and I will certainly search for the references of his presentation to improve my research.

Furthermore, the talks ministered by Pham Thi Sen and Lindiwe Majele Sibanda were memorable, not only by the importance of their research for agriculture and sustainability, but also for their history and journey through their careers. It was very inspiring to listen to these empowered women sharing their experiences and showing the role of woman in agriculture, which means we are, perhaps, one step closer to gender equality.

During the Crawford Conference it was also possible to learn more about Researchers in Agriculture for International Development (RAID) which is a platform promoting network for early to mid-career researchers with an interest in agriculture and international development. I appreciate the student’s presentations about their experiences working in development countries, especially considering their capacity to overcome difficulties, maintain the research and give their contribution to the society.

To conclude I would like to thank Forest Industries Research Centre (FIRC) and University of the Sunshine Coast (USC) for the opportunity to attend The Crawford Fund 2017 Conference. It is important to keep updated about the main agricultural topics and this experience was extremely informative. I will strongly recommend other students to attend future conferences as it is a good chance to develop networks, improve as a researcher and learn more about agriculture and sustainability.

