

Smarter Irrigation for Profit 2

RRDP 2005 Cross Sectoral Integration and Extension

Final Report



Participants Irricom February 2021 Moree

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Plain English summary

Communication and Integration

The communication and integration components of the SIP2 project aim to build on the research outcomes from *Smarter Irrigation for Profit Phase 1* and to support where practical the communication strategies of the individual projects. There was increased focus on infield interaction between researchers, advisers and producers, as well as increased attention on cross sectoral learning including from industries and sectors not involved in *Smarter Irrigation for Profit Phase 2*.

The primary components of the communication and integration plan are:

1. Project promotion and reporting,
2. e-learning communication and extension
3. Researcher, producer and service provider tours
4. Exposure to new ideas and transformative research
5. Professional development

1. Project promotion and reporting,

Articles appeared in: Australian Grain, Australian Cotton Grower, Irrigation Australia Journal, CRDC Spotlight magazine.

Conferences:

Smarter Irrigation for Profit Phase 2 aimed to be represented at a range of irrigation and industry conferences over the three years of the project including;

- evokeAg in February 2020. The theme 'Food, Farm, Future'. *Smarter Irrigation for Profit Phase 2* developed video content to promote the objectives of this collaborative project.
- Irrigation Australia Conference (IAL) & the International Congress on Irrigation and Drainage (ICID), rescheduled from September 2020 to October 2022. The theme 'Innovation and research in agriculture water management to achieve sustainable development goals.' Project partners have had 19 submissions for presentations accepted to be held in three SIP2 sessions. In October 2020 members of the SIP2 team participated in online presentations in lieu of the postponed conference, this attracted 165 registrations from 29 countries.
- Australian Cotton Conference rescheduled from August 2020 to August 2022. The theme 'Here for Good.' Five project partners have been asked to present in a SIP2 session.
- Irrigation Cropping Council (ICC) Irrigation forum rescheduled from July 2021 to July 2022. Grains, dairy and cotton are scheduled to feature at the seminar which is being sponsored jointly by CottonInfo and SIP2.
- Crop Consultants Association (CCA) Cropping Solutions seminar in June 2022 where Joseph Foley was asked to present on Irrigation Management – Getting the best Bang for your buck.

Additional conferences that have been cancelled include:

- Waterevolution: Peter Cullen Water and Environment Trust
- Northern Australia Food Futures Conference
- EvokeAG 2021

These events were seen as critical to support collaborative partnership and fostering transformative research. Providing an opportunity for international and cross industry

networking, professional development and to support implementation and generation of ideas, practices and new technologies. Their cancellation or re-scheduling has been unavoidable.

2. e-learning communication and extension

Several different options for e-learning were utilised. These include:

- Webinars. These initially proved popular allowing interested stakeholders to learn about the latest research findings without having to travel. As the pandemic progressed online fatigue impacted their success, however recordings did still prove popular as reference material.
- Podcasts: focused on the practical learnings from the program.
- Virtual field days aimed to be a series of short videos where project researchers discussed research activities. These were screened on-line on specific industry sites and on the *Smarter Irrigation for Profit Phase II* webpage.

3. Researcher, Producer and Service Provider Tours

The tours included actual field visits, field days and interviews at field days as well as virtual field days. Actual field days included site visits where researchers were supported in the presentation of their research to a broad target audience. Critical to these tours was the potential for learning across industry. Interaction between rice, grains, cotton, sugar and dairy was encouraged and where possible supported. The pandemic and resulting border closures significantly limited our potential to host these events. Several plans were developed, and a couple were able to take place in February 2021. Others needed to be cancelled due to lockdowns or lack of support from producers. There were several attempts to host virtual field days. Real time virtual events were not possible so video footage of trial sites and interviews with presenters were developed. It was found that recording and editing was more efficient and better quality if contracted to professionals. Over the last three years we have worked to develop more engaging formats, such as conversational videos and podcasts, to show irrigation research remotely. Some cinematographers were willing to try this approach others were not.

The *Smarter Irrigation for Profit Phase 2* database included a calendar of events where all partners could enter field walks, field days and information workshops. Where possible local initiatives were enhanced through inclusion of additional presenters and knowledge sharing between sectors.

4. Exposure to new ideas and transformative research

An important component of the integration project was to sponsor growers and researchers to attend precision agriculture and irrigation conferences and workshops to learn about emerging technologies with respect to water use and management. The advent of the pandemic led to the cancellation of most events which severely limited the projects' ability to achieve the objective. The intention was to target events that included sessions on 'step change' approaches on how water used to produce food and fibre may be managed in the future. Irricom was able to be hosted once during the project in February 2021. Additional sessions were planned in southern NSW, Victoria and Tasmania but could not be held.

There were several presentations during SIP2 online partner meetings including;

- Meshed LoraWan IoT Smart Agriculture
- Behavioural economics – importance of understanding what it is that we want farmers to do. Dr Gerry Wunsch QUT

5. Professional development

Professional development activities targeting service providers, researchers, commercial providers and interested producers were planned to build knowledge and understanding of new and existing technologies being developed and implemented through SIP2. These workshops were to explore the value proposition of technologies and strategies. An online survey and some small workshops were held using the Wardley and Sense Maker techniques. These have been followed by 'Adoption of Irrigation Technology' workshops where participants discussed various strategies associated with enhancing adoption of irrigation technology.

Additional options were offered including media training.

Extension

Smarter Irrigation for Profit Phase 1 found opportunities for improved water productivity and efficiency even on well managed farms. The project also identified key barriers to the uptake of good practice irrigation. These barriers were:

- Lack of awareness of poor practice and limited understanding of the potential to increase economic returns.
- The complexity of decision making in relation to irrigation performance particularly for dairy.
- Lack of skilled service providers
- Lack of evidence-based information on how to capture the economic and management benefits of new technologies.

Smarter Irrigation for Profit Phase II targeted these barriers by increasing funding to demonstrating R&D on irrigated farms. A network of 35 farmer led irrigation innovation and optimisation farm scale sites, and 11 key learning sites enabled local commercial demonstrations of optimised irrigation.

The project used the concept of "learning by doing", having recognised that everyone learns and changes through active adaptation of their existing knowledge with introduction of new information. This co-learning based research helped facilitate linkages between farmers, their service providers and researchers enabling faster transfer of research to end users. The key learning sites validated research results, tested 'fit for purpose' irrigation automation and management systems and provided opportunities for knowledge sharing and collaboration both within industries and between industries.

Expected outcomes:

At the conclusion of the SIP2 project the target audiences should have:

1. Gained an understanding of projects and research associated with SIP2 that are relevant to them.
2. Feel confident there are new and emerging cost effective, easy to use technologies that will help them grow more with less water.
3. Know producers and service providers are involved in the research to ensure it is easy to implement, is reliable, fits in with their current systems and is cost effective.
4. Feel confident in the researchers leading the sub-projects.
5. Be aware leading industry bodies are working collaboratively and effectively

Assessment of these expected outcomes from tours and field days has been encouraging, feedback from face-to-face events shows that producers have gained increased understanding of

irrigation technology and how it can be applied to their operations. The electronic material has been accessed by producers, but it is difficult to gauge how this material has impacted their understanding of or confidence in irrigation technology. The site has strongly advocated the integration of research on commercial farms and has actively promoted the lead researchers in the irrigation industry. The industry bodies and research partners have all been promoted in all the material developed as part of the SIP2 project in print, audio, video and online.

At the completion of the project there has been progress in improving producers understanding of the potential to increase returns through improved irrigation techniques, there has been some investment in tools and technologies, but there is still ground to be made. The complexity of irrigation decision making is real across all industries and the needs of individuals differ depending on their role within the farm organisation. The lack of skilled service providers remains a challenge which will need to be improved if adoption of technology is to increase.

This project was supported by funding from the Australian Government Department of Agriculture, Fisheries and Forestry and in-kind support from Gwydir Valley Irrigators Association and CRDC.

Abbreviations and glossary

IAL	Irrigation Australia Conference
ICID	International Congress on Irrigation and Drainage
ICC	Irrigation Cropping Council
CCA	Crop Consultants Association
GVIA	Gwydir Valley Irrigators Association
IREC	Irrigation Research and Extension Committee
USQ	University of Southern Qld
SIP2	Smarter Irrigation for Profit phase 2

1 Project rationale and objectives

The initial Smarter irrigation for Profit supported by the Rural Research and Development for Profit Program established key learning sites providing an opportunity for researchers, consultants, producers and industry support staff to see how irrigation technology could be applied to enhance resource management on commercial farms. This model was enhanced as part of Smarter Irrigation for Profit phase two. An important benefit of this approach is the opportunity for knowledge sharing and collaboration within and across sectors through tours, field walks and field days.

Under SIP2 the intention was to utilise the commercial demonstration and learning sites to improved cross-sectoral integration, to support more interaction between researchers and producers and to enhance peer to peer learning.

The project enhanced the extension of information from the research in print and electronic media in an easily understood and readily available format to irrigators across all agricultural industries, not just those involved in the program. The creation of an irrigation website Smarter Irrigation focused content on the application of new tools and technologies on-farm to improve efficiencies and profitability and was an important aspect needed to enhance extension of information.

1. To what extent can the use of producer and researcher tours facilitate the effective integration of findings from Smarter Irrigation research within and between industries

The intention was to complete five technical tours and to complete a series of inter-regional producer tours between sugarcane, dairy, cotton, horticulture and grains. The pandemic, lockdowns and associated border closures meant that hosting either technical or producer tours was extremely difficult. We were able to host one in February 2021, where grains, cotton and sugar industry attended an event. The tours from southern NSW to northern NSW attended the GVIA field day, where they joined participants from the sugar tour. Unfortunately, the uptake from the sugar industry was impacted by an outbreak in Brisbane. The field day had presentations from Deakin University, USQ, CSIRO, GVIA and commercial partners Padman Stops, GoannaAg, EnviroNode IoT and Netafim. Tours planned in later 2021 were unsuccessful as border closures remained a problem and producers were unable to leave farms due to extreme labour shortages. The tours that were held were very well received and provided good opportunity for cross industry integration, enhanced learning and improved understanding of commercial application of technologies. Feedback from the Southern Key Learning tour confirms this.

Have you gained knowledge or skills as a result of this tour? 93% said yes and mentioned the following.

- *Broad range of experiences and networking.*
- *I have gained knowledge in automation and the Macquarie marshes.*
- *Irrigation sensors and control and how the marshes work.*
- *A greater understanding overall.*
- *Digital farmtek and automation water savings.*
- *Just being able to hear the stories of locals, such as Harry Cush and the Burrima bloke's stories were very good.*

- *Information systems for irrigation scheduling and farmer knowledge sharing.*
- *An understanding of other farming areas.*
- *Less labour for irrigation.*
- *Farm irrigation systems.*
- *Macquarie Marshes and flood plain harvesting.*

In addition, feedback from the 2022 qualitative survey found; *“The SIP2 program was particularly beneficial to collaboration and networking with researchers in other industries.”*

“COVID significantly impacted the ability of interviewees to collaborate but more severely impacted their ability to network. Face-to-face interaction was mentioned as one of the most important aspects of collaborating with growers, researchers, and commercial partners. Moving online caused interviewees to rely on pre-established networks instead of creating new partnerships. Extension activity disruptions and field trips were commonly mentioned as the biggest losses as a result of COVID travel restrictions.”

2. How effective will the development of an electronic and print communication plan be at generating knowledge, extending information and broadening adoption of new and innovative tools and technologies to enhance irrigation efficiency, productivity and profitability?

The development of online information became the primary means to extend information. An extensive array of fact sheets, case studies, videos and podcasts were developed. As part of the project the Smarter Irrigation website was developed. This hosts all the material developed as part of the project. In addition, the project developed a Smarter Irrigation You Tube site and The SIP2 Podcast site. The @Irrigation4P twitter feed and the @SmarterIrrigation facebook feed complemented the website.

Having to rely on online information limited the potential for cross industry interaction. The 2022 qualitative survey noted *“Moving online as a result of COVID was detrimental to overall collaboration and networking but involvement in the SIP program meant that this was not as significant as it otherwise could have been.”*

Monitoring and evaluation early in the project indicated a need to ensure information was developed “at the farmer level” so it can be implemented. There was also requested for “more technical backup on some of the technology” Throughout the project we worked to provide as much of this online as we could.

During the course of the SIP2 program we determined that producers preferred industry specific details. To support this, we ensured online searches could be for industry, for topics or research organisations.

3. To what extent can professional development activities aim at raising awareness and building collaborations outside traditional partnerships foster transformative research activities?

At various stages during the project attempts were made to support professional development activities for research partners. Unfortunately, most events that could have provided this support for researchers were cancelled or rescheduled.

Only two activities Irricom and Adoption of irrigation technology workshop did take place and were able to provide some opportunities for participants to adopt a more future focused approach to solving the challenges of irrigation optimisation and adoption of technology. The

inclusion of producers, commercial partners and researchers made these events more valuable for participants.

2 Method and project locations

Name	Organisation/Business	Role
Alex Schultz	NSW DPI	Project lead
Andy McAllister	Agriculture Victoria	Project lead
Cath Lescun	Dairy Australia	Project Lead
James Hills	Tasmanian Institute of Agriculture	Project Lead
Michael Scobie	University of Southern Qld	Project Lead
Joseph Foley	University of Southern Qld	Project Lead
Hizbullah Jamali	CSIRO	Project Lead
John Hornbuckle	Deakin University	Project Lead
Greg Qiao	Melbourne University	Project Lead
Guy Roth	Sydney University	Project lead
Ben Crawley	NSW DPI	
Grant Oswald	Padman Stops	Commercial Partner
Ric Otton	EnviroNode IOT	Commercial Partner
Elsie Hudson and Susan Mass	CRDC	

The Integration and extension project worked across all five SIP2 industries, cotton, rice, sugar, grains and dairy. This included a range of different surface irrigation designs such as siphon, bankless channel, and border check. There were also stories developed for overhead irrigation (centre pivot and lateral move) and for drip irrigation.

Material developed was from researchers, grower groups and individual growers. Where applicable input from commercial partners was included.

Information from projects in Queensland, NSW, Victoria and Tasmania was developed and extended across the five industries and the four states.

The travel restrictions meant that recording field interviews and filming trials needed to be subcontracted and frequently done remotely. In some situations, project leads were able to guide and support this, in other communications briefs were required to ensure that as many messages were captured from researchers, grower partners and commercial suppliers.

3 Project Outcomes

3.1 Project level achievements

Provide a description of the project achievements against Output 5.3h and KPI 1.25, 2.28 and 3.25. Include graphs, tables and/or images where applicable.

Output and KPI numbers and description	Summary of achievements
<p><i>Output 5.3h. Implement an extension and media strategy to facilitate the effective integration of research findings and information resources. Incorporate cross sector inter-regional producer and researcher tours, event promotion and grower experiences of the Smarter Irrigation for Profit activities into the strategy.</i></p>	<p>The Plan was completed early in the SIP2 project focusing on building on the research outcomes from <i>Smarter Irrigation for Profit Phase 1</i> and to support where practical the communication strategies of the individual projects. The intention was for increased focus on infield interaction between researchers, advisers and producers, with increased attention on cross sectoral learning including from industries and sectors not involved in <i>Smarter Irrigation for Profit Phase 2</i>.</p> <p>The primary components of the communication and integration plan are:</p> <ol style="list-style-type: none"> 6. Project promotion and reporting, 7. e-learning communication and extension 8. Researcher, producer and service provider tours 9. Exposure to new ideas and transformative research 10. Professional development
<p><i>KPI 1.25 Develop a cross sector integration plan detailing producer and researcher tours, media tools to be used, mechanisms for reporting and strategies for collating learnings including how their effectiveness will be evaluated (Activity output 5.3h).</i></p>	<p>The project supported the design of templates for project summary fact sheets, case study, field day or events and headers and footers for each of the projects. The creation of this SIP2 branding ensures consistency in delivery of information to industry.</p> <p>An important aspect of the proposal was the development of a Smarter Irrigation for Profit website. With the Pandemic this site became even more important.</p> <p>The Integration, extension and communication plan initially included tours and cross industry events. As</p>

	<p>a result of travel restrictions, border lock downs and staffing issues, tours had to be replaced with videos, fact sheets, case studies, podcasts and webinars.</p> <p>Part of the cross sectoral integration plan involved participation in conferences. In 2020 three conferences were planned where Smarter Irrigation for Profit 2 Partners had an opportunity to participate; evokeAg March 2020, Irrigation Australia Limited (IAL)(in combination with International Congress on Irrigation and Drainage) and Australian Cotton Conference. Only evokeAg took place in 2020 and included a SIP2 video developed to introduce the research and the opportunity for collaboration and knowledge sharing to industries. Both the Australian Cotton Conference and IAL were initially re-scheduled for 2020 and then moved to 2022.</p> <p>The Smarter Irrigation for Profit Phase 2 database stores information associated with extension, communication, collaboration activities and technical material developed from each of the sub projects and the project as a whole. This was developed to include a calendar of events, designed to ensure all partners were easily able to determine when key activities were taking place. The pandemic limited the value of this. The database is an additional central location to store project material and enhance integration of learning across regions, projects and industry sectors.</p> <p>The cross-sector integration plan refers to and utilised the Smarter Irrigation for Profit Phase 2 Monitoring and Evaluation Plan. This draws on the framework developed in partnership by Sugar Research Australia and CRDC. The Plan developed by the Monitoring and Evaluation working group, and written by the Project Manager Cathy Phelps, utilises a combination of quantitative and qualitative techniques designed to collect information on behaviours, irrigation knowledge, and the use of technology or decision support tools.</p>
<p><i>KPI 2.28. Conduct cross sector producer and researcher tours and collate data on sites visited, activities showcased, farmer and service</i></p>	<p>Extensive effort has been put into extending and integrating as much information as possible despite</p>

<p><i>provider involvement, evaluation feedback and perceived effectiveness cross sector approach. Report on the implementation and reach of Smarter Irrigation for Profit 2 cross sector media activities including the integration of research findings and information resources (Activity output 5.3h).</i></p> <p><i>KPI 3.25. Conduct cross sector producer and researcher tours and collate data on sites visited, activities showcased, farmer and service provider involvement, evaluation feedback and perceived effectiveness cross sector approach. Report on the implementation and reach of Smarter Irrigation for Profit 2 cross sector media activities including the integration of research findings and information resources (Activity output 5.3h).</i></p>	<p>our inability to host producer or researcher tours due to Covid-19 travel restrictions.</p> <p>To aid in our ability to engage with and extend information across industry the Smarter Irrigation for Profit 2 website, Smarter Irrigation You Tube sites were completed. All the videos have been loaded onto the You Tube site; these videos had 595 views between 23 Mar and 14 Oct 2020.</p> <p>The website established in June 2020, and had 47 posts loaded in 2020, including project fact sheets, videos, events (virtual field days, webinars and one actual infield event), and webinars conducted by project partners including Dairy, GRDC and CRDC. Website analytics shows that between June and September 2020 there were 46,031 hits, 475 unique visitors and 1,205 visits.</p> <p>The extension and integration activities have all been on-line. Monitoring and evaluation information has indicated that there is a preference for industry specific information, the website enables industry specific searches to cover this need.</p> <p>Producers became overwhelmed with the large number of on-line events so planning and ensuring messaging was well targeted was essential to gain attention. Recorded webinars and factual videos have proved most useful.</p> <p>Given the continuing travel restrictions we encouraged project partners to take photos and videos of trials to create a project story and to enable promotion of research across the SIP2 program.</p> <p>The SIP2 podcast was developed and content was guided by a template for development of podcasts.</p> <p>The project used social media to create a brand and maintain a presence, there is a Twitter feed; @Irrigation4P and a Facebook account; @smarterIrrigation. The 2020 twitter monthly average of 12 tweets, 74 profile visits, 19 new followers, 9,943 Impressions and 11 monthly mentions.</p>
	<p>Tours: Two producer tours completed despite state border closures and concerns from participants</p>

	<p>eager to avoid capital cities. The February tours included;</p> <ol style="list-style-type: none"> 1. Opportunity for service providers and growers involved in the USQ sugar extension to visit the Darling Downs and northern NSW. and 2. NSWDPPI Southern Key learning sites (grower groups ICC, SG, IREC and CWFS) to visit northern NSW and the Macquarie marshes. <p>The Sugar tour Feb2021 was less well attended (5 participants; a producer, service provider and consultants) following the Covid outbreak and lock-down in Brisbane. The field day was seen as excellent value by those on the sugar tour and several of the technology options (SISCOweb and Plant based sensing) were seen as 'Very Likely' of adoption.</p> <p>The Southern Key learning sites brought 25 participants from southern NSW and northern Vic to the Gwydir Valley. There were a range of producers and industry representatives from commercial companies and southern Key learning sites.</p> <p>Southern tour feedback: Tour as a whole 86% excellent, 16% good. 93% gained knowledge or skills as a result, some areas where knowledge was enhanced included 'Irrigation sensors and control and how the marshes work.' 'Just being able to hear the stories of locals, such as Harry Cush and the Burrima bloke's stories were very good' 'An understanding of other farming areas'</p> <p>The reasons for participating included; 'To better understand cotton farming in Northern NSW' 'See and learn more about digital Ag'. 'Get off the farm and look at different things' and 'Learning about integrated and digital irrigation systems'. The highlights for the tour were 'GVIA Field Day and Macquarie Marshes x 2' and 'Talking to different farmers about the problems with water' Importantly 64% indicated that they will do things differently as a result of the tour including 'Evaluate automation more thoroughly'.</p>
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	<p>Planned tours to Moama in July 2021 and Griffith/Shepperton/Tatura in November 2021 had to be cancelled due to travel restrictions.</p> <p>Events: Irricom 2021 ‘Irrigation Technical Future Forum’ in Moree in February. Irricom included producers, commercial companies, industry partners and irrigation researchers. The objective was to identify current and future technologies and their fit for cotton irrigators. The focus was on panels and break out groups, with the cotton grower panel facilitated by CottonInfo. This ensured that the end user focus remained front and centre. The day highlighted that there are still challenges associated with adoption of technology, there is a need for more integration of data and decision making, grower needs need to be addressed, there needs to be consistency on industry benchmarking and improvements in soil moisture sensors and interpretation. Following the forum there were several discussions with commercial providers around the potential for a single open platform for irrigation automation and sensors.</p> <p>This led to the engagement of IPActive to complete a report ‘Data and system integration for improved irrigation management’</p> <p>Irricom feedback was very positive; ‘Great workshop to get a hold on the current issues and priorities for research’</p> <p>When asked about the most pressing irrigation issues to be addressed the survey identified; ‘evaporation losses’ ‘Ensure irrigation research and development will be relevant to commercial scale operations’ ‘unified delivery of farm device data and control mechanisms’ ‘integration of tools’ ‘measuring water use’ and ‘Adoption of the technology or improved management practices’</p> <p>Topics which could have been included were identified as; ‘Facilitating the adoption of technology on irrigation farms’ and ‘the issue of integration of multiple tools or lines of evidence’</p> <p>Feedback on the benchmarking project although positive of the concept indicated there are concerns</p>
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	<p>around confidence in the data, definitions and assumptions.</p> <p>Over 90% of respondents indicated that they would be very or extremely likely to attend a similar event in the future. Additional events were planned at Moama, Griffith and Tasmania but were not able to take place.</p> <p>Videos and Podcasts: As a means to try to extend project information we have developed a number of videos and podcasts. Initial attempts for videos asked project partners to do filming and recording. This was found to be unsuccessful, and a network of professional cinematographers were engaged to support projects.</p> <p>The podcasts were designed as conversational pieces to make them easy to listen to. The SIP2 Podcast has five recordings and there have been over 1,096 downloads. The podcasts are all loaded onto the Smarter Irrigation website. Some challenges with recording podcasts have limited the usefulness of this media.</p> <p>The Smarter Irrigation YouTube analytics show 1654 views between July 2021 and May 2022. The videos on the site are all loaded onto the Smarter Irrigation website and shared on social media at launch.</p> <p>Video content has improved as we encouraged more technical explanations of how and why and we moved to make them more interesting and more conversational. Where possible we got producers to be part of the video mix.</p> <p>Smarter Irrigation Website: Continues to be used as the project primary electronic resource. From July 2021 to May 2022 there were 5,960 page views, up 412% from 1,165 for the previous 12 months. The most popular pages were Dairy with 168 and Cotton with 153. The most popular articles were the 'Economic case study Integrated Smart Sensing and automation for cotton bankless channel irrigation' with 102 page visits and the 'Double cropping in a rice system' video with 100 views.</p> <p>Social Media: The SIP2 twitter account @irrigation4P has been updated with all video and</p>
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	<p>podcast launches. Average of 9.5 tweets, 264 profile visits, 15 new followers, 13 mentions and 8,651 impressions per month since Feb2020. The project is using social media to create a brand and maintain a presence, The 2021 twitter monthly average of 8 tweets, 247 profile visits, 11 new followers, 8,461 Impressions and 15 monthly mentions. The 2022 twitter monthly average of 8 tweets, 726 profile visits, 14 new followers, 6,262 Impressions and 15 monthly mentions.</p> <p>Facebook @smarterirrigation is also being updated regularly.</p> <p>Industry Activities:</p> <p>IAL/ICID online forum 'Addressing the global water challenge through autonomous irrigation' October 2020</p> <p>Australian Cotton Grower Virtual Forum in October 2021. Helped extend information from the Smarter Irrigation website</p> <p>Reviewed GrowAG SIP2 listings on the new website.</p>
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Please include information from any project specific evaluations you may have conducted.

3.2 Contribution to the SIP2 program objective

The objective of the SIP2 program is to realise significant productivity and profitability improvements for primary producers, through:

a) generating knowledge, technologies, products or processes that benefit primary producers

The Integration and Extension project worked to share grower and researcher knowledge both within industries and between industries. The tours and face to face events that did take place enabled irrigators to talk together to learn how tools and technologies were being applied.

Following the tour from Southern NSW and Victoria to Moree attendees were asked the following two questions.

1. What was the main reason for coming along on this tour? The responses included.

- *To understand cotton farming in Northern NSW*
- *Get outside of my patch with like-minded people.*
- *Learning.*
- *See and learn more about digital Ag. Get off the farm and look at different things.*
- *To get more knowledge in the industry.*
- *To learn more about automation technology.*
- *My boss wanted me to go so we can use the information to apply it to our farm.*
- *Update irrigation ideas and see a northern valley.*
- *To interact with other farmers and academics.*
- *To look at different farm technology.*
- *Improve knowledge.*
- *Learning about integrated and digital irrigation systems.*
- *See other areas and ideas*
- *Networking*

As we were significantly limited by covid, we had to provide access to knowledge sharing online via the [Smarter Irrigation](#) website. We did this with videos and podcasts, we tried to have researchers and producers in most of the online material so that individuals who accessed this got some of what they would have been able to get if they had been able to attend events in person. In several of the publications we tried to talk about the application of the research to commercial situations, so producers had more of an understanding of how to apply the technology. For example; [“Smart Automation in Rice”](#) and [“SISCOweb Cruise Control for Surface Irrigation”](#) series.

From July 2021 to May 2022 there were 5,960 page views, up 412% from 1,165 for the previous 12 months. The most popular pages were Dairy with 168 and Cotton with 153. The most popular articles were the [‘Economic case study Integrated Smart Sensing and automation for cotton bankless channel irrigation’](#) with 102 page visits and the [“Double cropping in a rice system”](#) video with 100 views.

b) strengthening pathways to extend the results of rural R&D, including understanding the barriers to adoption

All the material developed as part of SIP2 is available to producers from all irrigation industries on the [Smarter Irrigation](#) website. The site is divided by industry by topic. (Surface irrigation, Overhead irrigation, Soil, Rotations, Automated Irrigation, Scheduling Technologies, Tools and Sensors for Irrigation) and research organisation. The site includes videos, podcasts, fact sheets, case studies, webinars and project summaries so that producers can find whatever information they are looking for in which ever medium they prefer. All project partners and primary contacts are also available on the site.

Where it was possible to host face to face events they were very well received. This is especially so when they were hosted on commercial farms. This enabled producers to see technology in commercial settings. It also provided an opportunity to discuss the installation, use and maintenance of the technologies. Having commercial partners at these events was found to be very valuable.

Feedback from the limited number of events SIP2 integration was able to conduct showed positive insights. The value of commercial grower led research remains important to producers. As indicated by feedback from events.

- *‘Thinking about the Keytah Irrigation Efficiency research. How would you rate the value of Grower led commercial scale research?’ 53% indicated that they found it Extremely useful, and a further 43% found it very useful.*
- *‘Thinking about the Thuraggi Overflow siphon-less trial. How would you rate the value of commercial scale research?’ - Average 89%*

Additionally, feedback from the GVIA field day which hosted producers from sugar, grains, rice and cotton showed that following field days growers were more interested in making changes to their operations.

‘Thinking about the automated/remote control irrigation information presented: Please rate the likelihood of you adopting the following technology into your operations?’

	EXTREMELY LIKELY	VERY LIKELY	NOT SURE	SOMEWHAT UNLIKELY	UNLIKELY
Padman Stops Automated gates	35.00% 14	42.50% 17	20.00% 8	0.00% 0	2.50% 1
EnviroNode Farm Automation Control	5.13% 2	23.08% 9	51.28% 20	7.69% 3	12.82% 5
SISCOweb irrigation optimisation	5.13% 2	30.77% 12	53.85% 21	5.13% 2	5.13% 2
Plant based sensing for cotton irrigation in limited water	10.00% 4	40.00% 16	42.50% 17	2.50% 1	5.00% 2
GoannaAg GoField Plus	7.69% 3	48.72% 19	41.03% 16	0.00% 0	2.56% 1
Integrated Smart Sensing, automation with Padman gates	22.50% 9	52.50% 21	22.50% 9	0.00% 0	2.50% 1
Netafim Modnet modular drip irrigation system	2.50% 1	5.00% 2	25.00% 10	15.00% 6	52.50% 21

Irricom 2021 identified challenges associated with adoption of technology, *“there is a need for more integration of data and decision making, grower needs need to be addressed.”*

What are the major challenges or barriers for growers to adopt new technology to improve on-farm water management?

- *Ability to combine a range of different devices, inputs etc into the one place. Lack of a feasible value proposition for some entities. Reliability when it comes to automation (the trust in tech) is not quite there yet.*
- *Trust, connectivity and most importantly an understanding of how it will add value to their operations*
- *Standardization of interface to technology - To many APP "languages" for staff to learn. Sustainable service and support of technology Commercialization of technology given the very low real world market scope. A lot of what was discussed on the day is technologically possible and not that ground breaking to achieve. However due to relative small scale of irrigated agriculture compared to other industries its hard to achieve commercial scale of products compared to other industries*
- *Having a solution that is explicitly targeting a grower need, that is based on grower input to identify the problem and whether the solution is heading in the right direction.*
- *The actual path to adoption - knowing what will drive adoption, why a grower may or may not be able to utilise a new technology*

There was also a feeling “that conversations on the adoption of water-related innovations” are needed. “This includes understanding the process of how cotton growers make irrigation decisions among all sorts of factors. Understanding irrigation decision making and the dynamics of the irrigation decision process are fundamental to accelerate innovation adoption.” As an output of Irricom we developed the “Irrigation Decision making diagram” loaded onto the database.

Feedback from the 2022 St George field day provided the following insight into technology adoption.

With regard technology and automation what do you see as barriers to adoption?

	EXTREME BARRIER	MAJOR BARRIER	SOMEWHAT OF A BARRIER	NOT A BARRIER
Reliability of technology	33.33% 3	11.11% 1	44.44% 4	11.11% 1
Cost	37.50% 3	12.50% 1	37.50% 3	12.50% 1
Service provider support	20.00% 2	30.00% 3	40.00% 4	10.00% 1
Understanding the value of the technology	0.00% 0	12.50% 1	75.00% 6	12.50% 1
Understanding what the technology does	0.00% 0	12.50% 1	62.50% 5	25.00% 2

c) establishing and fostering industry and research collaborations that form the basis for ongoing innovation and growth of Australian agriculture.

The ability to collaborate in SIP2 has been wonderful despite travel restrictions. The project brought together some of Australia’s best irrigation researchers who were able to work side by side, and in many cases in joint projects. Importantly, providing opportunities for researchers to work with producers is invaluable.

Feedback has indicated *“that the value and knowledge producers brought were crucial for SIP2 activities. felt that for RD&E activities to be successful, they needed producers and service providers to show interest from the beginning. Commercial providers are more likely to get involved if producers see tangible benefits as a result of the RD&E. Producer feedback is important throughout as interviewees commonly mentioned that they often identify issues in RD&E activities that researchers may overlook because the issues may be specifically for their property.”*

The tours and cross industry events were another opportunity to collaborate. There were presentations from different research organisations and the audiences' included producers from different industries. Rice, grains, cotton and sugar were all able to attend a couple of events over the three years. Covid restrictions and boarder closures significantly limited our potential to do this as well as we had planned.

“Most interviewees felt that the program had incentivised them to go out and interact with more researchers, commercial providers, and producers. interviewees commonly said that it increased networking and collaboration. The SIP program was particularly beneficial to collaboration and networking with researchers in other industries.”

Additional feedback from events reinforces the importance of being able to share experiences at a producer and a research perspective, but also from a commercial providers perspective. Once producers see tools or technology in field, they are more easily able to see how it may fit their operations. They also know then that the technology has been tested and is more likely to be robust enough to be installed commercially.

GVIA Field Day 2021

Which irrigation systems would you like more commercial data on? - Automated bankless channel 80%

Southern Key Learning Tour

Will you do anything differently as a result of what you've learnt on the tour? 64% indicated yes.

- *Connect with grower groups to better understand the market.*
- *Evaluate automation more thoroughly.*
- *Invest in automation.*
- *Implement some automation.*
- *More automation and land forming.*
- *I would like to see the technical side/program used and the technology in use.*
- *Automation and crop monitoring.*
- *Implement farm automation.*
- *Carbon credits for cotton farmers.*

Irricom2021

Farming is a complex system with many factors influencing on-farm irrigation decisions. From the list please indicate which areas you consider in the development of automated irrigation.

- *Practicality 92%,*
- *Economics 85%,*
- *Labour 77%,*
- *Servicing and Post Sale Support 62%,*

- *Compatibility with existing systems 54%,*
- *Weather and soil type 54%*

What do you see as the most pressing irrigation issue to be addressed?

- *Ensure irrigation research and development will be relevant to commercial scale operations. Always be asking and considering how will this project be valuable to commercial scale Irrigation.*
- *As a tech development (engineering) company representative, the key takeaway was the need for unified delivery of farm device data and control mechanisms. We are aware of this, but excellent opportunity to hear more direct from those who attended.*

3.3 Contribution to SIP2 program outcomes

2. A more knowledgeable and skilled irrigation community with greater confidence in their ability to optimise irrigation performance.

Given that the majority of the integration and extension activities had to be online it was difficult to measure the changes in knowledge or confidence in optimising irrigation performance. Some of the face to face events did however provide some insight.

Siphon-less Field day 2022

How effectively do you feel you manage field losses across your farm? - Average 39%

Following the presentations are you likely to work to optimise your irrigation efficiency by;

- *Changing flow rates into fields – 44%*
- *Adjusting irrigation run times-44%*
- *Adjusting field length – 33%*

Please rate the likelihood of you making changes or adopting the following technology into your operations.

	EXTREMELY LIKELY	VERY LIKELY	NOT SURE	SOMEWHAT UNLIKELY	UNLIKELY
Automated gates (eg Padman stops)	10.00% 1	30.00% 3	40.00% 4	10.00% 1	10.00% 1
Transitioning fields to siphon-less designs	30.00% 3	40.00% 4	20.00% 2	0.00% 0	10.00% 1
SISCOweb irrigation optimisation	0.00% 0	20.00% 2	60.00% 6	10.00% 1	10.00% 1
Channel level sensors	20.00% 2	50.00% 5	20.00% 2	0.00% 0	10.00% 1
Improved monitoring of water in fields	40.00% 4	40.00% 4	10.00% 1	0.00% 0	10.00% 1

4 Collaboration

4.1 Project collaborations

Irricom 2021

Irricom 2021 brought research, producers, and commercial providers together. Irricom previously targeted Research and Development (R&D), but in 2021 one of the objectives was to present grower insights to future R&D. The inclusion of growers aimed to capture the big sky, novel and innovative ideas that address current farming problems and practical approaches to the complexity of farming. In addition, inviting commercial providers gave another insight into ensuring irrigation research is future fit.

One of the findings from Irricom 2021 was that there needs to be investigation into integrating the information collected from irrigation sensors across farms into more user-friendly systems. There were discussions on 'de-propiety' of products, or unified platforms for producers. This has led to several discussions between commercial providers, as well as the engagement of IPactive to review the value and challenges associated with data and system integration for improved irrigation management and automation.

Some of the commercial providers present at Irricom have been able to develop practical working relationships with researchers and amongst themselves.

SIP2 Partner Meetings

- Project presentations and sharing information in online meetings and at the March 2022 SIP2 forum.
- Sensor presentation – brought together Deakin University, Tasmanian Institute of Agriculture and University of Southern Qld to present on sensors

SIP2 Collaborative Presentations

- ICID presentation (October 2020) on 'Addressing the Global Water Challenge through Autonomous Irrigation' from Deakin University, University of Southern Qld with support from a sugar producer and a cotton and grains grower.
- ICC Irrigation Insights presentation (July 2022) on 'Optimising Irrigation Systems' from Agriculture Victoria, NSW DPI and GVIA

Joint Research Projects

- USQ, TIA and CSIRO
- Commercial Partners
 - Deakin University partnerships with Padman Stops and GoannaAg
 - University of Southern Qld demonstration with EnviroNode IoT (GVIA SISCO demonstration), Padman Stops (Siphon-less Optimisation), and Goanna Ag.
- CottonInfo, University of Southern Qld, GVIA partnership as part of CRDC2201 'Siphon-less Optimisation'

Qualitative feedback indicated; *“As co-researchers, some interviewees found commercial partners crucial in turning subjective decisions around irrigation into measurable benefits for producers. If they were involved in Sip2 projects, commercial partners were an important sounding board to create and develop projects and technology to benefit producers.”*

Sense Maker Meetings

As part of the project, we looked into the adoption of irrigation technology using Wardley mapping and Sense Maker. This brought together a number of service providers; consultants, equipment designers, suppliers and installers for the initial meetings. Following the completion of a broader industry survey we then held workshops to explore more ideas of how adoption of irrigation technology could be enhanced. The workshop included growers, extension, consultants and equipment and software designers.

Tour and Field Day Presentations

The GVIA field day hosted the Southern Key Learning tour and the Sugar Extension Tour. Presentations at the field day were from the following; Sundown Pastoral Company, Padman Stops, Goanna Ag, Deakin University, USQ, CSIRO. Netafim, EnviroNode IoT and GVIA.

The St George Field day presenters were, USQ, Padman Stops, Saunders Farming, Cotton Info, NSW DPI and GL Irrigation.

4.2 Recommendations for activities to support future collaborations.

Comment on the factors need for successful collaborations. Were there any barriers or impediments to project delivery associated with the collaboration and what solutions did you implement to overcome these?

The initial design and content of the Smarter Irrigation website was very broad with search capability only at an industry level, this has since been tightened. Producers prefer to source information more specific to their own industries. As such the communication of information has needed to adjust to position tools and technologies to suit the needs of producers.

Often research organisations are competing for the same very limited funds. While ever this is the case there will be some challenges in developing strong working relationships between these organisations. SIP2 was designed as a collaborative project and those engaged in the project were able to work constructively together. Longer projects would be beneficial to enhance this collaboration.

5 Extension and adoption activities

5.1 Project extension & adoption activities

Tours

1. Southern Key Learning tour to northern NSW February 2021
 - a. 25 participants
2. Sugar Extension tour to northern NSW February 2021
 - a. 5 participants

Events

1. St George field day 2022
 - a. 20 attendees
2. IREC field day 2022 – Whitton NSW
3. Irricom February 2021
 - a. 31 attendees from rice, cotton and sugar
 - b. Research (17), producer (5), extension/consultant (3), industry (4) and commercial (2) representation
4. IAL/ICID webinar:
 - a. Addressing the global water challenge through autonomous irrigation October 2020.
 - b. Presentation from John Hornbuckle, Joseph Foley, cotton and rice grower James Tuscan and sugarcane grower Aaron Lynton.
 - c. 165 registrations from 29 countries.
5. Australian Cotton Grower Virtual Forum in October 2021.
 - a. Facilitated inclusion of SIP2 projects
 - b. Helped extend information from the Smarter Irrigation website
6. EvokeAg March 2020
 - a. Prepared SIP2 video presentation for the event
 - b. Reviewed GrowAG SIP2 listings on the GrowAg website 2020

Re-scheduled Events

1. ICC seminar Moama Victoria
 - a. Postponed from 2021. Scheduled for July 2022
 - b. Presentation from Alex Schultz, Andy McAlister and Lou Gall
 - c. Presentation from RMCG (SIP2 contracted information)
2. Australian Cotton Conference 2022
 - a. Postponed from 2020. Scheduled for August 2022
 - b. SIP2 session including presentations from John Hornbuckle, Joseph Foley, Hizbullah Jamali, Aaron Simmons and Lou Gall.
3. IAL/ICID seminar
 - a. Postponed from 2020, Scheduled for October 2022
 - b. 19 presentations accepted

Electronic media

1. Smarter Irrigation Website:
 - a. Launched June 2020
 - b. Continues to be used as the project primary electronic resource. From July 2021 to May 2022 there were 5,960 page views, up 412% from 1,165 for the previous 12 months.
 - c. The most popular pages were Dairy with 168 and Cotton with 153.
 - d. The most popular articles were The 'Economic case study Integrated Smart Sensing and automation for cotton bankless channel irrigation' with 102 page visits and the Double cropping in a rice system video with 100 views.
2. The Smarter Irrigation YouTube
 - a. analytics show 3026 views between July 2021 and July 2022. The videos on the site are all loaded onto the Smarter Irrigation website and shared on social media on launch.
3. The SIP2 podcasts
 - a. The podcasts are all loaded onto the Smarter Irrigation website. Some challenges with recording podcasts have limited the usefulness of this media.
 - b. From initiation there have been 1,096 downloads.

Print Media

1. Articles in
 - a. Australian Grain yearbook 2021
 - b. Australian Cotton Grower April-May 2021
 - c. Australian Grain Sept-Oct 2021
 - d. Spotlight winter 2021
 - e. Australian Cotton Grower Feb-Mar 2022

Social Media

2. The SIP2 twitter account @irrigation4P has been updated with all video and podcast launches.
 - a. Average of 9.5 tweets, 264 profile visits, 15 new followers, 13 mentions and 8,651 impressions per month since Feb 2020.
 - b. The 2020 twitter monthly average of 12 tweets, 74 profile visits, 19 new followers, 9,943 Impressions and 11 monthly mentions.
 - c. The 2021 twitter monthly average of 8 tweets, 247 profile visits, 11 new followers, 8,461 Impressions and 15 monthly mentions.
 - d. The 2022 twitter monthly average of 8 tweets, 726 profile visits, 14 new followers, 6,262 Impressions and 15 monthly mentions.
3. Facebook @smarterirrigation is also being updated regularly.

5.2 Lessons learnt and recommendations for future extension.

The initial plan focused on infield interaction between researchers, advisers and producers, as well as increased attention on cross sectoral learning. The primary components of the integration and extension project were.

1. Project promotion and reporting,
2. e-learning communication and extension
3. Researcher, producer and service provider tours
4. Exposure to new ideas and transformative research
5. Professional development

Associated with this plan was the SIP2 database where all project partners were asked to store project information and to add details of planned events. The calendar of events was used most effectively by projects where grower groups were project collaborators.

The drought of 2019 and lack of availability of irrigation water impacted the infield research activities for some projects for 2019-2020. This limited some of the early project extension. Planning was well underway in early 2020 to initiate some of the researcher tours. The arrival of Covid and subsequent lockdown prevented these activities. The ongoing border closures exacerbated the situation.

The plan was forced to transition to be almost 100 percent reliant on e-learning. This created additional challenges as producers were being targeted online by all extension outlets. Zoom and webinar fatigue set in quickly and engagement in activities such as webinars dropped. Webinar recordings did however still get used. The project looked at means to develop 'virtual field days'. Travel restrictions, poor field connectivity and high costs prevented real time virtual field days. Instead, we attempted pre-recorded videos of trial sites with researchers discussing trials. Initial attempts were satisfactory but highlighted that to develop suitable sound and visual quality needed to engage audiences we needed training, support and possible outsourced video development. Video recording hints and training did take place. The use of a number of professional cinematographers was more successful. A large number of videos have been developed and are available on the Smarter Irrigation website. The inclusion of producers in this was attempted to provide more real experiences for audiences. In an attempt to make content more interesting and engaging we attempted to make videos more conversational. There was significant reluctance from some cinematographers, despite this there are several video conversations that have been posted.

To provide a range of options for irrigators to use there were also podcasts and webinars developed. Industry specific webinars proved more successful and were successfully delivered by the Beyond Water Smart (TIA) and What is my Yield Gap? (Dairy Australia) projects.

Encouraging participation in some of the online material was challenging as researchers were struggling with other challenges associated with the pandemic such as access to trial sites, remote management of trials, availability of equipment for research and the broader social impacts of extended lockdowns and isolation. In addition, producers were being constantly invited to online activities and grew tired of the pressure.

Face to face learning remains the most effective means of research extension. The biggest challenge is to get and maintain commitment from all partners, producers, research, consultants and extension. In the last three years everyone has been struggling with labour shortages and are all very time poor.

Feedback from events such as the southern key learning tour to the GVIA found the following.

Have you gained knowledge or skills as a result of this tour? 93% said yes and mentioned the following.

- *Broad range of experiences and networking.*
- *I have gained knowledge in automation and the Macquarie marshes.*
- *Irrigation sensors and control and how the marshes work.*
- *A greater understanding overall.*
- *Digital farmtek and automation water savings.*
- *Just being able to hear the stories of locals, such as Harry Cush and the Burrima bloke's stories were very good.*
- *Information systems for irrigation scheduling and farmer knowledge sharing.*
- *An understanding of other farming areas.*
- *Less labour for irrigation.*
- *Farm irrigation systems.*
- *Macquarie Marshes and flood plain harvesting.*

The greatest value is also achieved when the research is conducted on commercial farms and researchers work in partnership with growers and where possible commercial partners.

- *'Thinking about the Keytah Irrigation Efficiency research. How would you rate the value of Grower led commercial scale research?' 53% indicated that they found it Extremely useful, and a further 43% found it very useful.*
- *Thinking about the Thuraggi Overflow siphon-less trial. How would you rate the value of commercial scale research? - Average 89%*

When travel restrictions started to lift, we once again tried to host tours and events, only to be confronted with a second wave of restrictions and flooding. In addition, the pandemic had a significant impact on farm labour. Farmers found that due to labour shortages they were not able to participate in events over more than a single day.

All project material will remain available on the Smarter Irrigation website until July 2025 to help ensure project learnings can be shared beyond the lifetime of the project.

Throughout the project information collected as part of the Monitoring and Evaluation plan identified that one of the gaps impacting adoption of technology was reliable access to service providers. To try to understand this better, and consider possible options for industry, the project engaged Emergent Futures to conduct some Wardley Mapping, a Sense Making survey and workshops to explore this further. The findings suggest that challenges such as cost, reliability and easy of use are at play, but also that interoperability between technologies of various supplies is an important issue.

6 Appendix - additional project information

6.1 Sub-project, media and communications material

Nature of materials / activities	Number	Details (Please provide details if appropriate (eg links to publicly available documents))
Press releases		
Media appearances – press and TV		
Brochures, fact sheets, posters and newsletters		Articles in Australian Grain year book 2021 – Section 13 Advancing Irrigation Australian Cotton Grower April May 2021 Australian Grain Spotlight Winter 2021 Australian Cotton Grower Feb-Mar 2022
Web page		Smarter Irrigation The SIP2 Podcast Smarter Irrigation YouTube
Field days, expos, field walks		Southern Key Learning Tour to northern NSW Sugar Extension Tour to northern NSW
Stakeholder forums, meetings, presentations, workshops, webinars		IAL/ICID Webinar on Addressing the Global Water Challenge Through Autonomous Irrigation 29th October 2020 Australian Cotton Grower virtual forum GVIA field day: https://smarterirrigation.com.au/gvia-smarter-irrigation-field-day/ Irricom held in Moree 11Feb2021 GRDC research update irrigation. https://smarterirrigation.com.au/grdc-grains-research-update-online-irrigation-north/ St George Field day March 2022
Social media presence		@irrigation4P @smarterirrigation
Scientific conference presentations		Abstract and acceptance to present at ICC Irrigation Insights seminar IAL forum Australian Cotton Conference

