



Learn, Share, Connect and Be Inspired: How one Farming group in Australia is driving PA adoption

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The use of Precision Agriculture (PA) technologies and techniques continues to expand in Australia. The Society of Precision Agriculture Australia (SPAA) has been instrumental in driving the adoption and development of these techniques to support industry and Australian farming communities.

Abstract. *SPAA supports innovation, and innovation includes people. Founded in 2002, SPAA, a not for profit extension body, is Australia's only dedicated farming group communicating and advocating for the increased adoption of PA. It provides independent, timely and relevant information to the grains, winegrape, sugarcane, horticulture and livestock industries. Annually, over 2000 participants have benefited from SPAA events and publications, and in turn these members have helped drive research, development and extension that deliver on-ground benefits to farmers and industry stakeholders. With access to networks Australia wide and quality information, the opportunities for members to share ideas are a critical element of progressive and resilient farming communities. We strongly believe in the SPAA motto of 'Guiding you to farming success'.*

SPAA provides support and information, facilitating access to learn about the capabilities of a range of PA innovations that are applied across a wide-range of agricultural sectors, through a multitude of extension programs, methodologies and resources. Adoption success has been championed by extension and outreach programs focused on engagement, practical implementation and farmer case studies. This access to timely PA information, through SPAA seminars, workshops, expos, magazines, factsheets and online channels including a popular website and social media, results in better informed, and more confident decisions being made.

The varying rates of PA adoption across industries and between technologies present a number of challenges. SPAA believes in ensuring that farmers and industry personnel are up-skilled in the use of technology currently on the market and seeks to improve the knowledge

and use of these. Using examples from the grains and winegrape industries as the springboard for adoption and expansion, cotton, vegetable and livestock industries continue to be areas for further expansion as research investments are expanded.

In 15 years, SPAA has made significant contributions to promoting the uptake and adoption of PA innovations on farm through learning, sharing, connecting and inspiring. Through traditional dissemination and modern outreach initiatives, SPAA keeps PA innovations at the forefront, ensuring a viable Australian agricultural industry.

Keywords: *agricultural extension, case studies, outreach, social media, networking, publications, adoption*

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Introduction

The adoption of new *Precision Agriculture (PA) technologies* in agriculture is rarely immediate. Even though much effort is placed on persuading users to adopt new tools, adoption is a complex activity and many factors influence these decision making processes (Robertson et al., (2012) and Rogers (2003).

Precision Agriculture in Australia has been used for approximately 20 years (Whelan, 2011), with the PA concept of farm management developed in the mid-1980s in Europe (Haneklaus et al., 1991; Schnug et al., 1991) and the US (Robert et al., 1991; Robert, 1993) . The framework of PA focuses on a concept of fit between different variables. According to Pierce & Nowak (1999), PA provides the possibility to do the right thing, in the right place, in the right time and in the right way. Many aspects of PA have been studied, focusing on relevant technologies, environmental effects, economic outcomes, adoption rates and drivers of adoption and non-adoption.

Since its inception in 2002, the Society of Precision Agriculture Australia (SPAA) has functioned to support farmers and the wider Australian agricultural community in the broadacre cropping, horticultural, viticultural and livestock industries in the adoption of PA (Bramley and Trengove, 2013). Through traditional communication and developing platforms, SPAA helps to disseminate PA research, demonstration and application while promoting the economic, environmental and social benefits of PA adoption to Australian agriculture at a regional and national level. Collaboration across industry sectors and between farmers, industry specialists and researchers is central to the success and values of SPAA.

Who is SPAA? (www.spaa.com.au)

SPAA is a national non-profit, independent membership-based group. It aims to promote and advocate for PA in Australia, supporting the development and adoption of precision technologies by farmers and advisors as a means of enhancing the profitability of crop and animal production systems whilst promoting environmental and sustainability awareness programs. Established by a small group of South Australian based graingrowers, consultants and researchers in 2002, issues of equipment incompatibility between manufacturers and a basic lack of on-farm skills were key drivers for SPAA's formation. In its start-up phase, it focused primarily on extension workshops and meetings for southern Australian grain growers. These events brought together farmers, industry specialists and researchers to share their knowledge and experience of using PA technologies. This successful model is now replicated across Australia with a number of agricultural sectors engaged. These include dairy, winegrape, sugarcane, and fruit and vegetable horticulture.

The organisation has an Australia-wide focus, achieved by collaborating and partnering with other organisations. At the end of April 2018, there were 378 financial members. Its wide membership base is a reflection of the potential that is offered by PA across industry sectors and of the generic nature of the application of PA to crop production. SPAA has a close working relationship with universities, research institutes and companies leading the development of PA in Australia.

SPAA's current committee is served by a team of volunteer farmers, researchers and industry specialists. This brings independence and collaboration across all areas and is a key element

of the success of the organisation. The committee is supported by a small regionally-located and part-time operations team with sub-contracted roles.

A characteristic of Australian agriculture, especially in the grains sector, is the existence of many ‘farming systems groups’ typically built around a group of farmers and their agronomic consultant(s). A recognisable difference between SPAA and the many farming systems groups operating across Australia is that its primary focus is an extension body. It relies on the fostered relationship with research communities from universities and government institutes and acts as a vehicle to disseminate their findings. SPAA has a clear focus and whilst many farming groups across Australia deliver research, development and extension (RD&E) services, they too offer programs from agronomy, social well-being, business management, and more, but with limited expertise in each field they cover.

SPAA has eight key goals:

1. Contribute to the achievement of financial sustainability, productivity and on-farm benefits for farmers and agriculture businesses through being a premier source of PA information for Australian agriculture;
2. Nurture precision agriculture businesses;
3. Identify and support SPAA’s key clients whilst establishing strategic alliances and opportunities with new stakeholders;
4. Identify and reward industry participants to establish a wider (national) network of precision agriculture advocates;
5. Facilitate increased intergroup collaboration and effectiveness;
6. Identify new/existing technology opportunities – support new innovations;
7. Facilitate Agronomist training workshops – build capacity for the support industry; and
8. Identify new skilled programme presenters.

The SPAA Extension Model – Keys to success and recognising our failures

SPAA is unique in that it has developed a broad mix of learning and practical opportunities for the entire PA value chain which cater for the critical aspects as described by Abadi et al (1999) and Pannell et.al. (2006). Through a range of structured extension and outreach activities SPAA has increased the adoption of PA. This is evident by the feedback process undertaken for each of the events SPAA holds, which highlights that PA technologies have now been adopted, to at least some extent, in many industry sectors. In particular, guidance, auto steer, yield mapping and variable application of inputs are the technologies most widely adopted.

Central to SPAA’s operations is communication of PA through events, publications and the use of social media, all equally important key platforms in the SPAA extension strategy. In recognising that not “one glove fits all”, SPAA is conscious that farmers are at different stages of their PA journeys. A myriad of approaches must be applied to communication styles and a suite of products and activities are produced annually. SPAA introduced “learn-from-a-farmer” into workshop and event schedules as a farmer panel, involving farmers at different stages of their PA adoption plan sharing their positive and negative experiences.

Key elements of SPAA’s activities have been the operation of grower groups and hands-on workshops that complement the array of publications it produces and the hosting of industry ‘expos’ and research symposia, the latter in partnership with the Precision Agriculture Laboratory at the University of Sydney (<http://sydney.edu.au/agriculture/pal/>).

Past activities include a grower group program, traditionally funded through Research and Development Corporations (RDC) and federal government programs administered through local natural resource management authorities. The groups typically met two to three times per year, with meeting topics relevant to the time of year. Issues covered have included yield mapping, data management, on farm trials, crop sensors/imagery, soil sensors, weed seeking and mapping, auto-steer and machine control. The groups have been instrumental for growers to learn from each other, with many shared experiences; exit surveys show that they have been highly valued by participants. SPAA has also brought in experts and farmers from other regions to share their knowledge and experience, something which would not have occurred without the associated funding support.

Whilst funding challenges have restricted SPAA's use of this group training model, efforts remain to host at least one event every two years in these former grower group localities. In many regions there has been obvious improvement in the knowledge and support from commercial dealerships particularly in the grains industry. One might also see SPAA breaking out from its origins in broadacre where very traditional extension/engagement practices are used to other industries where that doesn't occur so readily e.g. horticulture, livestock which is distributed across the country and have their own particular way to engage. However, there are still large areas across Australia and agricultural sectors that remain poorly serviced and this highlights the important role of SPAA in providing advice on how best growers should use the PA hardware and software they have purchased. As the PA industry continues to mature, the aims of SPAA continue to be relevant.

A team approach to PA learning - Involving members

SPAA members play an essential role in promoting and advocating for the adoption of PA. In an attempt to support innovation, current industry needs are highlighted and products and programs are developed to suit.

Recent examples include:

1. PA Factsheets – a project funded by the South Australian Grains Industry Trust (SAGIT). SPAA was contracted to produce six factsheets on a range of PA tools and technologies. Rather than the organisation decide on the topics, an online survey was distributed to select such topics, ensuring relevance to all stakeholders.
2. Quantity of outreach – Every two years, SPAA conducts a survey to evaluate the needs of its supporters, both farmers and industry and importantly its corporate sponsors. These surveys are seen as an important measure to ensure that SPAA outputs (publications and events) are meeting stakeholder expectations. One outcome of these surveys was the Precision Ag News (produced by SPAA since 2003) now being trialled as four issues per year and the e-newsletter now distributed on a monthly basis, with shorter, more effective content.
3. Event feedback forms also provided an opportunity for delegates to nominate the topics they would like to hear and learn more about at future events, further enhancing the success of SPAA. Together with event ratings (of activity and presenter), SPAA poses the question of “practice change”. As each event holds a tailored and varied program, it is difficult to determine the exact adoption rates. However, the intention to change is generally noted by 80% of delegates at each event. The single biggest “change” intended is the use of technology if the equipment has the capabilities, and utilising contacts and networks made. This contributes to increasing knowledge and adoption.

Current extension and outreach activities

Events

Workshops, field visits, expos, conferences and training activities are all event formats used by SPAA to help engage and connect farmers and industry personnel with PA. The objective of these is to build confidence in the use of PA technologies. Audience size can range from a room of 10 farmers to a conference venue of 150 or more. Irrespective of event style, SPAA extension events bring together practitioners, including leading farmers, machinery and industry specialists, researchers and commercial agronomists, with experience in the practical application of PA tools on-farm or agricultural research.

SPAA extension events always provide high exposure to sponsors, who are provided with the opportunity to present. Over the years, sponsors have evolved their presentations to practical descriptions of the equipment or support services they provide to more farming systems approaches and applied use of the technology. The structure and content of all SPAA extension events is designed so that participants have plenty of time for questions and to network with speakers and other delegates. Smaller, local or industry-specific events, often based on a half day of presentations followed by an optional on-farm tour or hands on hardware/software training, has proved a popular structure with delegates and funders.

A recognised challenge exists for funding of extension events as the interest in PA increases as to the number of providers that compete against SPAA.

Publications

SPAA produces both electronic and hard copy publications to keep members and the wider industry informed of PA developments, user experience and SPAA events. Many of these publications can be viewed on SPAA's website (www.spaa.com.au) with members accessing all publications as part of their subscription fees.

'Precision Ag News' is a magazine-format newsletter that is circulated four times a year to members. It is the *only* independent, cross-industry magazine dedicated to the adoption of PA in Australia. In addition to general PA news, each issue contains 'case studies' describing farmer and advisor use of PA, and articles provided by researchers.

'PA in Practice' - editions I and II (Southern Precision Agriculture Association, 2008; SPAA Precision Agriculture Australia Inc, 2012) were produced by SPAA with support from the Grains Research and Development Corporation (GRDC), comprising farmer case studies, 'to do' checklists and tips, as well as articles from researchers and industry specialists on implementing PA in grains production. Over 2000 copies of this publication have been distributed to farmers or downloaded from the website. It is also now used as course material at two Universities. Recent factsheets have covered topics such as Drones, Weed Sensing and Crop Sensing. These are designed to provide readers with a quick 'go to' source of information.

SPAA circulates its 'e-news' to over 2000 members and non-members now twelve times per year.

Social media – digital profile

Social media and farming are not always the most obvious companions. Nonetheless, farmers are recognizing the value of social media and how various platforms can be utilised to share

information about their businesses and sectors. Informal metrics have shown that many Australian farmers are using social media platforms such as Twitter[®]™ as a method of sharing technical information or posing technical questions. Consequently, social media is becoming a popular method by which SPAA communicates with members and attracts new members and supporters. SPAA has over 1900 followers on its Twitter account and is regularly active on Twitter[®], Facebook[®] and YouTube[®] (Table 1). It is evident that since using these digital platforms a greater number of farmers and industry personnel are finding out about SPAA’s activities and they are now the most effective and low cost marketing strategy to promote and invite delegates to SPAA events. Social media has also proven a popular means of connecting with the international PA community, with keynote speakers being recruited through direct contact on these platforms.

In acknowledgement of the power of social media, SPAA has initiated a structured social media policy to help foster brand loyalty by providing powerful, emotive, compelling and technical content. Loyalty to SPAA is also promoted by being responsive to inquiries and issues raised on social media platforms. SPAA uses social media to build a lasting connection with members, stakeholders and followers, increase brand awareness, enhance SPAA’s reputation, interact with its target market informally, gain insights about PA developments and trends, advertise events, publications and membership benefits, and network with others with similar interests and objectives. Analytics are used to identify the effectiveness of engagement.

Table 1 *Frequency of SPAA’s digital engagement*

Digital platform	Frequency of engagement
Twitter	> 3 posts per week
Facebook	> 2 posts per week
E-news	12 issues per year
Website	as required

Overcoming challenges

Monitoring and evaluation play an important part of the SPAA model, with the committee assessing its performance regularly, and seeking feedback at events and through the biannual member feedback survey. A detailed risk assessment was completed as part of the SPAA strategic plan, with the following challenges identified:

1. Maintaining a cohesive and focused organisation and committee while growing nationally
2. Supporting an expanding and diverse membership base (adjusting delivery to the national scene)
3. Maintaining ongoing member value for PA
4. Keeping up to date with technological developments and advances
5. Competing successfully against other groups and media ‘space’ to maintain relevancy and ensure SPAA remains relevant (not redundant)
6. Developing and maintaining a skilled and representative committee
7. Maintaining relevancy in local communities and dealing with strong seasonality of the agricultural industries
8. Measuring the effectiveness and outcomes of SPAA’s objectives, projects and actions; ultimately contributing toward increased levels of PA adoption

Where to next? *Opportunities to grow SPAA (or improve PA adoption)*

As a part of SPAA’s Strategic planning, and consistent with its goals and objectives, four strategic directions and a number of consequent actions have been developed to assess value, presence, performance and sustainability and drive SPAA’s direction into the future.

<i>Direction</i>	<i>Action</i>
Value (being regarded important and useful)	<ul style="list-style-type: none"> - SPAA to be a relevant organisation - Increase perception of SPAA value
Presence (being a premier source of PA information)	<ul style="list-style-type: none"> - Maintain an up-to-date website with links to and from other appropriate sites - Improved mediums for communication with members, growers, sponsors, researchers, grower groups and industries - Member satisfaction of SPAA communications and events - Monitor use and access of PA information
Performance (our process of performing function)	<ul style="list-style-type: none"> - Identify/ review gaps in PA and develop and implement mitigation strategies - Increase the collaboration and skills of the PA support industry - Maintain quality face-to-face events - Facilitate international information sharing - Increase focus and partnerships with research and new technology providers to act as an information delivery vehicle - Develop project blueprints
Sustainability (our ability to be maintained at a certain level)	<ul style="list-style-type: none"> - Manage human resourcing needs for the organisation - Maintain an effective planning and governance framework - Enhance financial viability

Since 2002 the range of technology and PA providers has increased markedly and maintaining relevance will be major challenge. Additionally, the speed of technology development will make it difficult for farming groups to stay on top of and be able to provide validated advice.

Conclusion

For the past 15 years, SPAA has been advocating and supporting the adoption of precision agriculture, through learning, sharing, connecting agri-businesses and supporting producers in the adoption process.

It is important to understand that the goal of any rural extension is to engender practice change. Whilst informed non-adoption is a reasonable outcome, SPAA’s focus is on the cost-effective adoption of PA practices.

Information, in one form or another, will always appeal to the information seekers and digital technologies, along with social media, are finding their place in a whole new generation of information seekers. But providing assistance to growers in evaluating which new technologies to adopt is an important element of SPAA’s work.

Much of this has been provided by delivering technical and practical information to help farmers and the broader PA value chain gain confidence in the application and use of PA software and hardware. . Through its cross-industry, multi-faceted, but farmer-focussed membership SPAA has developed a broad ‘professional network’ in PA systems underpinned by extension events, publications and the use of social media. For SPAA, extension in the future must be much broader in its appeal. It must use emerging tools and new models and be channelled through skilled personnel who are not only technically competent but have the

human skills to communicate with the broader farming community to promote positive change.

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References

- Abadi Ghadim AK, Pannell DJ (1999) A conceptual framework of adoption of an agricultural innovation. *Agricultural Economics* 21, 145-154.
- Bramley RGV, Trengove, S 2013. Precision Agriculture in Australia: present status and recent developments. *Engenharia Agricola* 33 575-588.
- Hanklaus, S.; Lamp, J.; Schnug, E. Erfassung der räumlichen Variabilität von Rapserntemengen in Ertragskarten. *Raps*, v. 9, p. 142-143, 1991.
- Leonard E, *Precision Ag News*, ISSN 1449-3705, Society of Precision Agriculture Australia Inc. Australia. All issues available online <http://www.spaa.com.au>
- Pannell DJ, Marshall G, Barr N Curtis A, Vanclay F and Wilkinson R. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian Journal of Experimental Agriculture* 46(11), 1407-1424.
- Pierce, FJ & Nowak, P. (1999). Aspects of Precision Agriculture. *Advances in Agronomy*. 67. 1-85. 10.1016/S0065-2113(08)60513-1.
- Robert, P. (1993), Characterization of soil conditions at the field level for soil specific management. *Geoderma* 60, 57-72.
- Robert, PC., Thompson, WH & Fairchild D. (1991). Soil specific anhydrous ammonia management System. In: *Automated agriculture for the 21st century: Proceedings of the 1991 symposium*. ASAE Publication 91, 418-26.
- Schnug, E.; Hanklaus, S.; Lamp, J. Continuous large scale yield mapping in oilseed rape fields and application of yield maps to CAF. *Oilseeds*, Washington, v. 9, p. 13-14, 1991.
- Southern Precision Agriculture Association 2008, *PA in Practice: grain growers' experience of using variable rate and other PA technologies* (Ed: E Leonard), Southern Precision Agriculture Association, Australia 2008
- SPAA Precision Agriculture Australia Inc, 2012 *PA in Practice II*, (Ed. C Nicholls and M McCallum), SPAA Precision Agriculture Australia Inc, Australia 2012
- Whelan, B. 2011. A review of the history of Precision Agriculture in Australia and some future opportunities, Australian Centre for Precision Agriculture, Sydney University. <http://sydney.edu.au/agriculture/pal/documents/Brief%20History%20of%20PA%20in%20Australia.pdf> (retrieved 12/01/2017)