



# EXTENSIONNET

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Merry Christmas and  
happy new year to all  
APEN members!



## Developing decision support systems for farm management

### A conceptual framework from the sociology of science and technology

Story by **Emma Jakku, Peter Thorburn and Clare Gambley**

CSIRO Sustainable Ecosystems

Remember decision support systems? They haven't gone away, and the technobabble that accompanied their development in the 80s and 90s has given way to a more sophisticated and human-centric approach. Here, Emma Jakku (CSIRO) tells how DSS development has benefited from an injection of good old sociology.

Decision support systems (DSSs) are increasingly being identified as a means to improve the management of complex farming problems. However, making DSSs relevant to farmers is a challenge. We have looked to concepts from the sociology of science and technology to help with this challenge and increase our understanding of the social factors and processes that influence the development and adoption of DSSs. These concepts will then be used to guide the implementation of strategies to encourage broader uptake of DSSs.



Principal author Dr Emma Jakku is a Post-Doctoral Fellow looking closely at participatory research. She's with the Tropical Landscapes program under CSIRO's Sustainable Ecosystems division. Contact Emma at [Emma.Jakku@csiro.au](mailto:Emma.Jakku@csiro.au)

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APEN is pleased to acknowledge the support of:



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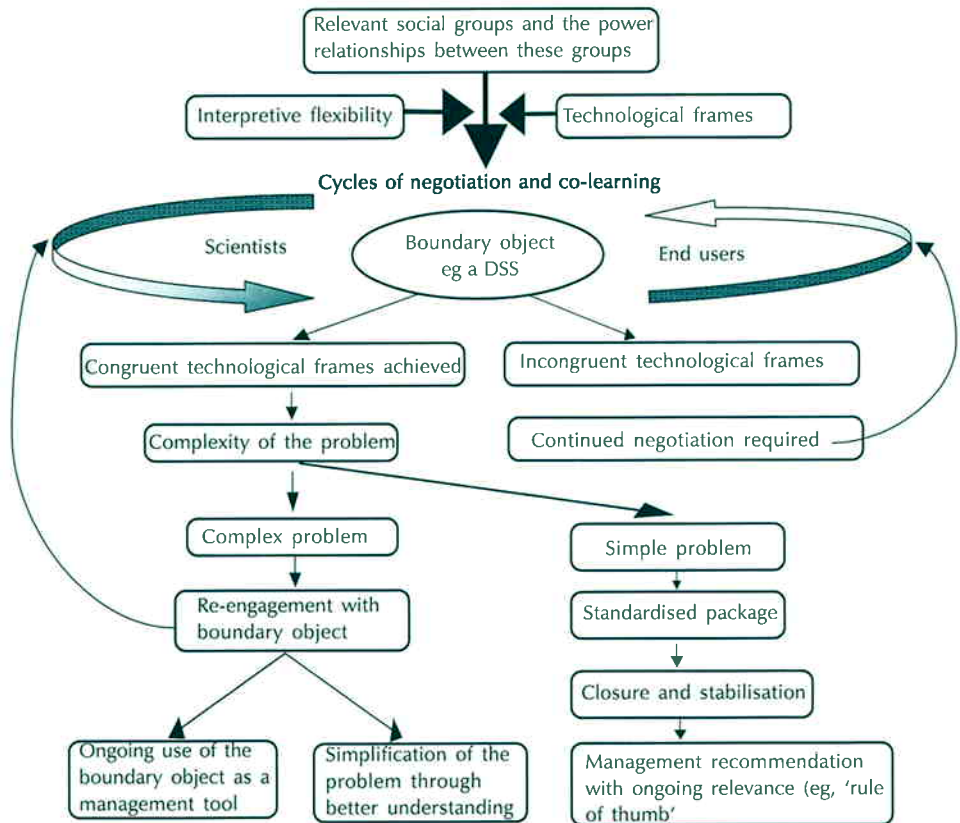


# DSSs for farm management (cont'd from p1)

## Conceptual framework for understanding the development and implementation of DSSs

The figure on this page illustrates the way in which concepts from the sociology of science and technology provide a framework for understanding the development and implementation of DSSs.

**Below: Framework clarifying the social processes influencing the development and application of agricultural DSSs**



**A boundary object provides a common point of reference for conversations and a means of translating abstract and complex ideas**



### Relevant social groups, interpretative flexibility and technological frames

- In the case of agricultural DSSs, the *relevant social groups* usually include farmers, scientists, extension agents, government officials, agribusiness and possibly other community groups. Power differences between these groups can influence the level of involvement of each of these groups in the design of DSSs.
- *Interpretative flexibility* highlights the way in which DSSs can mean different things to the various relevant social groups.<sup>1</sup> This reinforces the value of participatory action research, since by working more closely together, scientists and end users can learn from each other.
- *Technological frames* clarifies the different meanings that social groups attribute to

DSSs by providing an analytical structure for identifying the different assumptions, beliefs and expectations that social groups hold about a DSS.<sup>2</sup>

### Boundary objects

- The concept of a *boundary object* is valuable for understanding the *cycles of negotiation and co-learning* that are important in the development of a DSS. A boundary object provides a common point of reference for conversations and a means of translating abstract and complex ideas.<sup>3</sup> A successful boundary object is able to mean different things to different people and still maintain a common identity.
- A DSS can act as a boundary object because it allows for negotiation, cooperation and co-learning between multiple social groups.

- Through repeated cycles of negotiation and co-learning, the different social groups may develop a shared understanding of the problem, which leads to the establishment of *congruent technological frames*.

## Complexity of the problem

- The *complexity of the problem* that the technology addresses is a key feature that influences the way in which a DSS is developed and used.
- DSSs that address *complex problems* need to go through a longer phase of acting as a boundary object. Through these further cycles of negotiation, a better understanding of the problem can develop, which may allow for *simplification of the problem* within the management and biophysical context of the social groups.
- If simplification of the problem is not possible, then the *ongoing use of the boundary object* is required, whereby the DSS continues to influence management through its role as a boundary object. This raises the issue of who undertakes the ongoing operation of the DSS.
- DSSs that address *relatively simple problems* are more likely to act as *standardised packages*, which provide a more clearly defined set of guidelines for practice.<sup>4</sup>
- This allows for *closure and stabilisation*<sup>5</sup> of the problem, which facilitates the development of a *management recommendation* with ongoing relevance. The implication of this is that for simple problems, a DSS may become redundant once it has fulfilled its function as a tool for co-learning and the development of a shared understanding of the problem. This should be interpreted as a positive outcome for the application of the DSS.

## Conclusion

Concepts from the sociology of science and technology can add to our understanding of how social factors influence the design and use of DSSs, including the way in which different people will perceive and interact with DSSs. The framework outlined in this story encourages critical reflection on the way in which DSSs might be more effectively developed in partnership with relevant stakeholders. When applied to

agricultural DSSs, these concepts highlight the potential for DSSs to facilitate negotiation and cooperation between the multiple groups of people involved in farm management, making the process and product of DSSs more relevant to key stakeholders and therefore more likely to be adopted. We are applying this framework to case studies of DSSs for seasonal climate forecasting, irrigation scheduling and nitrogen management to empirically test how much this framework could contribute to our understanding of the challenges and opportunities for developing agricultural DSSs and facilitating the wider adoption of these new technologies.

## References

<sup>1</sup> Pinch, T. and Bijker, W. (1987) 'The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other', in Bijker, W., Hughes, T. and Pinch, T., (eds) *The Social Construction of Technological Systems*. Cambridge, MA: MIT Press.

<sup>2</sup> Bijker, W. (1987) 'The social construction of Bakelite: Towards a theory of invention', in Bijker, W., Hughes, T. and Pinch, T., (eds) *The Social Construction of Technological Systems*, Cambridge, MA: Massachusetts Institute of Technology Press; Orlikowski, W. and Gash, D. (1994) 'Technological Frames: Making Sense of Information Technology in Organizations', *ACM Transactions on Information Systems* 12: 174-207.

<sup>3</sup> Star, S. and Griesemer, J. (1989) 'Institutional Ecology, "Translations", and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology 1907-1939', *Social Studies of Science* 19: 387-420.

<sup>4</sup> Fujimura, J. (1992) 'Crafting Science: Standardized Packages, Boundary Objects, and "Translations"', in Pickering, A. (ed.) *Science as Practice and Culture*, Chicago and London: University of Chicago Press.

<sup>5</sup> Pinch and Bijker, *op. cit.*

## Acknowledgements

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**DSSs that address relatively simple problems are more likely to act as standardised packages, which provide a more clearly defined set of guidelines for practice**

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# Agricultural departments in flux in Australia

Agricultural and kindred departments are evolving in each state and territory of Australia – as well as in New Zealand – as governments struggle to keep pace with a diversifying primary production base and a growing emphasis on export-related agriculture.

In this special ExtensionNet report, we'll try to bring you up-to-date with some of the major changes that have been happening around Australia. It might help when you're next talking to interstate colleagues who announce they're from an organisation about which you've never heard before ...




Qld: investor-delivery model



NSW: extension support unit to be set up



VIC: post amalgamation planning



TAS: stable over last few years

In many ways, the challenges faced by the state government agricultural departments are similar to those faced by the country's primary producers, who have had to diversify, expand or completely change their operations (and sometimes all three) as a way of staying competitive in a fast-changing environment.

The changes have necessarily seen repercussions flow through to the extension sector. In some states, extension has been more significantly affected than in other states.

Not only that, the pace of change has left even extension veterans operating at the national level somewhat bamboozled. In some states, the changes in extension policy appear to have been made, un-made and re-made in the time it takes some extension officers to start and finish an extension project.

The general theme appears to reveal a desire to amalgamate departments that share interests in land, water and natural resources. Thus, some primary industries organisations around Australia have evolved to become "super-departments" incorporating extractive industries like mining and petroleum.

Some states have also sponsored positions that could generally be described as "Chief Extension Officers" whose role involves plotting the extension futures for their respective departments.

In **Queensland**, the Department of Primary Industries changed its name to the Department of Primary Industries and Fisheries (DPI&F) after the last state election.

Extension services have moved to an "investor-delivery" model with Industry & Investment and R&D strategy being the main investors and extension has been charged with delivering outcomes on their behalf. Current extension activities linked to projects is continuing. It's early days yet and extension staff may soon be partaking in short courses to help them understand the new opportunities. Chief Extension Officer is Dr Gus Hamilton. Queensland DPI&F is at [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au). Queensland also has a Department of State Development and Innovation, a Department of Natural Resources and Mines, and an Environmental Protection Agency.

In **New South Wales**, a recent amalgamation of departments saw minerals, fisheries, forests and agriculture come together under the banner of the NSW Department of Primary Industries which can be found at [www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au). The former NSW Agric specialised Extension Support Unit in the Regional Relations & Education Branch will be set up to look after extension training, property management planning, and monitoring and evaluation. There are still between 350 and 400 front line extension and education staff in NSW.

In **Victoria**, an amalgamation that foreshadowed what was going to happen in NSW brought together agriculture, fishing and aquaculture, minerals and petroleum, science and R&D, and trade and investment. On the website at [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au), the Agriculture and Food page has a link to "Research and Education".

In **Tasmania**, the Department of Primary Industries, Water and Environment incorporates numerous divisions including quarantine, fishing and aquaculture, food and agriculture, environment, water, and land information (maps, titles etc).

Feedback from Tasmania indicates that extension services are thinly spread over the island, but that - unlike the other eastern states - there has been no significant organisational restructuring in recent years. Because of the scale of enterprises in Tasmania, state-sponsored extension often happens in partnerships with other organisations such as RDCs. One officer added there was a "lift in energy" in Tasmanian extension after the APEN forum in late 2003.

In **South Australia**, the Departments of Primary Industries and Resources (PIRSA) and Water Land and Biodiversity Conservation (DWLBC) provide the bulk of rural extension services. PIRSA – [www.pir.sa.gov.au](http://www.pir.sa.gov.au) – has policy responsibilities for aquaculture, biosecurity, energy, field crops, fisheries, horticulture, livestock, minerals and petroleum and owns two corporatised entities: SARDI, which is the research arm, and Rural Solutions, that is charged with handling the 'delivery' (extension) work.

Rural Solutions operates on a fully commercial basis and - though a preferred provider for the government - competes in the private sector for extension type activities that is now increasingly delivered through the consultant and agri-business sector.

The word 'extension', is now seldom used or heard, although much activity is carried out that appears to look very much like extension!

Extension in the production sector is now largely paid for privately or subsidised by industry funded programs and delivered by Rural Solutions, consultants or agri-business. Where market failures and public good are more clearly defined, FarmBis subsidies have been instrumental in delivering better planned, more accountable and learning outcome focused extension.

By far and away, the bulk of government-funded extension occurs in the NRM sector, where very few have ever heard of extension, but where there are significant employment and professional development opportunities.

In **Western Australia**, the Department of Agriculture incorporates agribusiness and markets, animals, crops, biotechnology, farm management, horticulture, pastures, pests, sustainability, and finally land, water and environment. Find it at [www.agric.wa.gov.au](http://www.agric.wa.gov.au).

Feedback from Western Australia suggests that state is in transition with private agencies increasingly delivering services formerly supplied by government. The WA DoA, however, is still keen to engage with primary producers and provide access to government information at a physical level (technology transfer) and at an intellectual level (capacity building). There is no Chief Extension Officer in the west but there is an Extension Development Group that meets and tries to inform policy development.

In the **Northern Territory**, primary industries comes under the banner of the Department of Business, Industry and Resource Development (DBIRD). Find it at [www.dbird.nt.gov.au](http://www.dbird.nt.gov.au).

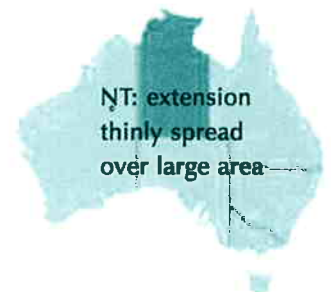
Top end extension officers haven't felt the winds of organisational change as keenly as some of their southern counterparts, but longstanding challenges remain: isolation, distance and a wide range of agricultural enterprises requiring advice and service. Feedback from the Northern Territory suggests that extension officers have had to accommodate the needs of mature industries (eg mango) that are embarking on serious export programs as well as start-up niche focused crops. This work is carried out over the vastness of the Territory and it's difficult for extension officer to get together regularly (or even occasionally) to discuss their profession.

Dr Gus Hamilton, from Qld DPI&F, says most departments and extension agencies are undergoing "some restructuring and realignment at the moment" in Australia.

"On one level it's an opportunity but on another it's hard work because there are frustrations with the limitations on what can't be done anymore," Gus says.

"Everyone's trying to find their own place in the sun and finding new mechanisms to navigate through different models and approaches," he says.

"But there's been some across-the-board recognition, I think, of the role that extension plays and in some departments it's got a higher profile than it did before."



## APEN President's Report for 2003/04

### John James

#### *APEN President*



John James - APEN President

Our last AGM was held at Meadowbanks Estate in Tasmania, during the successful 2003 Forum "Extending extension: beyond traditional boundaries, methods and ways of thinking". APEN celebrated its 10<sup>th</sup> birthday at that event and we thought it timely to discuss the possibility of restructuring APEN to help make it even more effective. We were given a mandate to progress this and much has happened since then, so let me outline some of the highlights.

#### ACHIEVEMENTS

In my mind the main achievements for this year were:

1 The APEN Management Committee (MC) continued its efforts in better communicating and engaging with its members by sending out regular eBulletins, using an informal communication style to highlight items of importance to members. This and the online surveys helped us better engage with members about the proposed changes.

2 APEN has taken significant steps in the development of a National Extension Framework for Australia by holding a workshop with invited key stakeholders from all state agencies, commonwealth agencies and consultants in July at Sydney. This allowed further discussions in a complicated area with involvement from outside the APEN membership. The Framework continues to evolve with great assistance from Greg Leach, Jess Jennings and the other members of their steering committee. Funding from the Cooperative Venture for Capacity Building, the Centre for Rural and Regional Innovation - Qld, and Meat and Livestock Australia helped finance the Sydney workshop.

3 We have received a significant influx of new members this year. A total of 112 people from varied backgrounds have joined our ranks. The trick now is to continue meeting their needs so they become long-term members. As a professional association we aim to provide opportunities for networking, professional development and representation.

#### CHAPTER ACTIVITIES

There have been good levels of activity occurring in some of our Chapters and I congratulate those who have done the organising and kept things moving.

The **WA Chapter** were involved in four major activities:

- 1 An APEN display at the ANZRSAL conference and sponsored delegate - September 2003
- 2 Part sponsorship of visit by Dr Dindo Campilan (Philippines) and workshops at Northam, Buntine, South Perth and Manjimup - March 2004 .
- 3 AGM and presentation from Sergeant Geoff Dixon (WA Police) on Change management in the WA police force - May 2004.
- 4 Networking workshop - Professional development for members, Andrew Huffer - July 2004.

The **Melbourne/ Gippsland Chapter** ran five events:

- 1 Community engagement in the developing world - learning from the Crawford Fund's experience in community and agricultural development, Ted Hayes - August 2003.
- 2 Environmental education extension and evaluation in the land of the thunder dragon - an experience of living and working in Bhutan, Penny Richards and John Weiss - November 2003.
- 3 Conditions influencing on-farm implementation of education and training learning outcomes, Kevin Balm - March 2004.
- 4 Engaging small and culturally linguistically diverse landholders - learning new approaches from the USA experience, Richard Molinar, University of California Cooperative Extension Service - April 2004.
- 5 Effective community engagement - ideas for the new millennium, Robert Chaffe - August 2004.

The **Tasmanian Chapter** organised the 2003 Forum in Hobart and three other activities:

- 1 Partnerships in extension between private and public industry workshop and AGM – March 2004.
- 2 Stonefruit industry first to sign partnership with State Government, Anna Steinhauser – August 2004.
- 3 Managing change in the fishing industry, Sandra Gillanders – August 2004.
- 4 The trials and benefits of running Woolnorth and other Tasman Agriculture properties, Colin Armer and Colin Glass – November 2004.

The **SE Qld/ N NSW Chapter** ran the following events:

- 1 Extending extension – insights from the Tassie national forum, Caloundra – February 2004
- 2 A forum on evaluation, Brisbane – August 2004.

The **NZ Chapter with AgResearch** will be run a Learning and Human Capability Conference on November 23 and 24, 2004 in Hamilton, NZ.

All these activities have had both member and non-member presenters and participants. They have provided valuable networking and professional development opportunities. Our intention is that all members will have more opportunity to be involved in such activities with clusters meeting within regions and interest group clusters meeting over the internet in email discussion groups.

## OTHER ACTIVITIES

Greg Cock and I have invested a lot of time and effort into the restructuring of APEN by revising the constitution, which I hope will lead our organisation into an even more effective and viable future. We will talk more about this later on.

ExtensionNet continues to go from strength to strength with Darren Schmidt at the helm. He has done a great job sourcing relevant articles and increasing the people focus of the newsletter.

The joint AAAC/APEN accreditation project stage 1 report was reviewed by RIRDC and a decision made not to progress with the project as it was thought that the end users (farmers and landholders) did not demand accreditation of practitioners in agriculture, NRM and related sectors.

The Management Committee has met by teleconference every second month to progress a range of issues, all under the umbrella of the business plan. I'd like to take this opportunity to thank each of the members... Greg Cock (vice-president), Jane Weatherley (secretary), David Bicknell (treasurer), Darren Schmidt (editor), Greg Leach, Neels Botha, Liz Kellaway, Cynthia Mahoney, Jess Jennings and Greg Owens. I would also like to specially thank our Secretariat, Rosemary Currie, who enables most of the management committee work to actually happen.

ENET

*Has your job changed?  
Moving or shaking?  
Tell us about it!*



## From the editor

Since the last edition, I've changed jobs. Fortunately, I'm still in the extension sphere and I've been encouraged to continue my editorship of ExtensionNet which is wonderful. Even though I had reservations about leaving my old job (unfinished business, ideas yet to be put into action etc) I'm glad I took the plunge. The challenges are new, the people are new and the in-tray has filled again to its familiar groaning capacity.

As professionals focused on - amongst many other things - change management, extension officers can often be conservative with their own career progression and just as frightened of change as anybody else. Take it from me: change is scary!

A new year is as good a time as any to have a close look at your experiences, skill sets and qualifications and determine for yourself if you've changes to make.

Darren Schmidt

