

SEARCH CRITERIA

Model	Model C: Technological Development Model
Industry	Grain, Cotton, Rain-fed agriculture
Focus/Level	Industry
Purpose	Increasing knowledge, Testing available knowledge
Outcomes	Development of a management practice, development of a decision support system
Special Interest Groups	Other
Design and Implementation	Designed and managed by researchers/experts

1. PROJECT TITLE:

FARMSCAPE Online

2. FUNDERS:

Rural Industries Research & Development Corporation (RIRDC)

CSIRO

Farmer participants (in-kind)

3. PROVIDERS:

CSIRO

4. KEY CONTACTS:

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5. INDUSTRY / ISSUE / GEOGRAPHY

Grains / cotton industries in selected parts of Queensland, Northern Victoria, Western Australia and New South Wales.

Rain-fed Agriculture

6. PROJECT CONTEXT

Almost a decade of research by CSIRO resulted in a way for farmers, their advisers and researchers to jointly investigate and discuss pertinent farm management issues aided by computer based crop simulation. Demand steadily grew for such sessions until requests from farmers outstripped our ability as a research group to deliver. Our research focus then turned to 'how to deliver such sessions in ways that were sustainable and more cost effective'. Two questions were posed: i) could the commercial advising industry deliver FARMSCAPE based tools and techniques given the right training and support?; and; ii) could the internet reduce the costs of delivering FARMSCAPE experiences by reducing the requirement for travel and associated costs?

This project researches the use of Internet based delivery for FARMSCAPE tools and techniques. Rural telecommunications infrastructure is characterised by low bandwidth and unreliable data connections when compared to urban services.

The initial focus of this project was joint investigations of issues relating to production eg effect on yield (and gross margin) of different planting dates, rates of fertiliser etc.

As the project developed, there has been an increasing emphasis on dealing with natural resource management issues, such as drainage.

7. PROJECT NICHE (SPECIFIC OBJECTIVES)

This project had a number of objectives.

To conduct programs of internet-based interactions between farmers and professionals to develop: a practical and commercially-feasible methodology for facilitating learning programs for farmers within their own farming situations; an interactive online method for consultants to provide farmers with customised soil monitoring and simulation support for timely planning and decision making.

To develop online multimedia resources to aid farmers' learning about key soil processes and agronomic practices that provides insights for better crop and soil management.

To conduct an 'interested observers' program, whereby other researchers and interested parties will be actively invited to observe the running of these sessions.

8. PHILOSOPHY/APPROACH

The FARMSCAPE (Farmers, Advisers, Researchers, Monitoring, Simulation, Communication And, Performance, Evaluation) has been used as the basis of this activity. FARMSCAPE is an approach that emerged from ten years research (McCown, R.L. et al) into the use and non-use of decision support systems in agriculture. FARMSCAPE provides a framework for taking computer based crop models onto farms for joint discussions between farmers, their commercial advisers and researchers about pressing production issues.

Action research played a central part in this project. Action research provided a framework for researchers to get involved directly in farmers real problems. A central part of this project was 'What If Analysis and Discussion Session.' This involves taking computer simulation 'on farm', specified for that farmers paddocks, and used as the basis of joint discussion between farmers, their advisers and researchers. The methodology of action research insured relevance to farmers' real problems. Action research essentially involves consecutive cycles of joint planning, action, and reflection.

9. RESOURCES, MANAGEMENT AND STAFFING STRUCTURES.

CSIRO together with its partners have invested over 10 years researching and developing the FARMSCAPE approach. Partners include:

Rural Industries Research and Development Corporation (RIRDC)

Grains Research and Development Corporation (GRDC)

Birchip Cropping Group (BCG)

Wesfarmers Landmark

Michael Castor and Associates

Ward Consulting

Hassall & Associates

10. PROCESS AND METHODS USED

A typical engagement with the farmer group generally comprises the following sequence:

A face-to-face orientation workshop. This involves an in-field soil workshop, and an introduction to interacting online- including the use of NetMeeting, online group facilitation and an outline of technical requirements.

A plan to monitor soils on key participants farms is jointly designed. This involves measuring key soil characteristics, including upper and lower limits, bulk densities, and EC's.

Simulations for individual farmers paddocks are then run, based on data collected from soil monitoring- for scenarios jointly negotiated with participant farmers.

These simulations are then used as the bases for an 'online discussion session' between CSIRO researchers and farmers.

The interaction is then evaluated in two modes, process and impact.

11. IMPACTS TO DATE (AND EVALUATION APPROACHES USED)

A qualitative approach to evaluation is used based on case study methodology. This is undertaken in two modes: i) external independent evaluation, and ii) internal evaluation. Both of these address two key criteria, which are the *performance* of researchers acting in the engagement and *impacts* that can be attributed to the engagement. Methods include face-to-face and phone interviews with farmer participants, and video recording of online sessions. Below is a sample summary of the independent external evaluation.

Changes in decisions

A number of participants had made changes in their decisions: 'When we ran it through the program we changed fertiliser rates.' 'I will test APSIM for chickpeas. We got a good profit out of it, and then measured 197 kg N / ha in the soil after the chickpeas, worth \$120 per ha.' 'One of the days the simulation was here, we were looking at putting mungbeans as a double crop into wheat stubble. The simulation suggested not, we did not do it and saved money.' "

Changes in practices and potential financial returns

Interviewees mentioned substantial changes in practices and in financial benefits: 'In stead of wandering around after rain with a probe, we now use the corer and measure; before we used a shovel and it was not well done.'

'It led me to invest in a spreader to put urea on as the crop is growing, in stead of heavy early applications and then getting low rain. I will now try to fertilise according to the rain, alter the rate in accordance with the season.'

'It encouraged us to go into zero-till, get more moisture into the soil to flush out the salt. A negative of zero-till is diseases, but that needs crop rotation, that was brought home in these meetings.' 'When we ran it through the program we changed fertiliser rates.'

'We went from conventional to minimal till, that created disease problems. Now we have gone to rotations, we ran the model to see the financial effects. I was happy with the results.'

'Once I saw the yield potential we increased fertiliser usage. I had the idea that legumes supplied enough, but we went from 0 to 100 kg Urea per ha. We match urea better to the crop, are setting up for side dressing. In a trial paddock I did we went from 2 to 3 tonnes per ha and from ASW to AH grade, a 50% increase in yield and \$30 per tonne premium: 2 t @ \$110 gave \$220, with a gross margin of \$5 per ha. 3 t @ \$140 gave \$420, with a gross margin of \$200 per ha. On a total of 430 ha wheat that would have meant about \$83,500 extra Gross margin from wheat. Now everything gets fertilised. That was all due to a change in my thinking, and that is

what APSIM does. Fortunately the season was good and showed the education benefit.'

Changes in knowledge and insights

All interviewees reported changes in insight: 'Main thing I got out of it was an analysis why in particular years when there was plenty of moisture, the crop did not use all the Nitrogen. That was all about timing of application of N to be used by the plants.' 'We did work on rotations. Surprise was that the most intensive system is most profitable. But when we changed some assumptions it brought it back considerably.'

'I was not aware of a lot of the detail about soil characterisation, rotational program, and the bottom line.' 'We got a better understanding what makes good soils, how to get more water into the soil ... learned about soil fertility.' 'It gave potential yields, about double of what we thought and get, due to soil types, compaction etc.' 'We need to go back and find out what we do wrong. The model challenges our benchmarks.'

'The characterisation and modelling confirmed a lot of learning. I was trying to find things about the soil, APSIM gives a frame work to hang info about soil. It also showed a lot of gaps in our knowledge.' 'What we thought was right was not. Wheat, short fallow, sorghum, wheat showed how far behind the potential we are.' 'I would never have thought about planting chickpeas or mungbeans, now I may do that.'

12. EFFECTIVENESS

The following quote is an extract from an external evaluation undertaken by SyTREC Pty Ltd for CSIRO in relation to this activity: "These changes in decisions, practices, knowledge and understanding indicate that using the Internet as a major communication tool has worked. This opens an additional venue for future APSIM accredited people to reach out to more and distant clients, either directly or in cooperation with local advisers and consultants."; "The rate of change ... has been quick, and the potential financial benefits of the changes is substantial. This has most likely contributed to the general willingness [by farmers] to consider paying a private consultant [for FARMSCAPE tools and techniques] after the APSRU project finishes."

13. PROJECT DOCUMENTATION AVAILABLE

Van-Beek, P. 2001. *An evaluation of delivering APSIM and FARMSCAPE via the Internet: the Moonie component*. SyTREC Pty Ltd. Queensland.

Van-Beek, P. 2001. *An evaluation of delivering FARMSCAPE via the internet: the Birchip component*. SyTREC Pty Ltd. Queensland.

Hargreaves, D. 2001. *Annual Progress Report: project CST-6A*. CSIRO, Toowoomba.

Hargreaves, D.M.G. Hochman, Z. Dalgliesh, N. and Poulton, 2001. *FARMSCAPE online- developing a method for interactive Internet support for farmers situated learning and planning*. 10th Australian agronomy Conference. Hobart.

14. ISSUES

The primary issue remains the state of rural telecommunications infrastructure. The project team is researching the use of alternative connection methods including satellite, and other connections.

Another issue is how to go beyond an intensive researcher-producer interaction to consultant-producer or producer directly using the tools in planning and decision-making.

15. COMMENTS/CONCLUSIONS

Demand for these sessions has outstripped CSIRO's ability to deliver. They are working with the commercial advisory industry in Australia to develop commercial services based on FARMSCAPE tools and techniques. Internet delivery is central to the cost effective delivery of FARMSCAPE tools and techniques.

The sessions observed between the researchers and a grower group was very impressive. It appeared to be less intrusive than a group of 'experts' going to a meeting with producers. Producers were on their own ground and in control. The researchers acted as facilitators and provided explanations. The producers set the agenda and used the simulations and researcher comments to bounce off their own ideas, test it against local knowledge and to stimulate discussion. It was professionally carried out and worked well. It would be good to see this approach expanded to other situations and other industries.

16. REVIEW METHODS

Participant explanation and review.

Participation as an 'interested observer' in an on-line session with a grower group.

Project documentation.