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Piloting internet based support for farmers' situated learning

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Abstract: Our research has found that farmers in a highly variable climate can benefit from computer-aided discussions concerning their planning and decision making. This project investigates how to facilitate farmers' situated learning experiences about risk management using the internet. The project was motivated by the failure of farmers to embrace traditional computer-based decision support systems (DSS). Our research found that simulation-based decision support software designed to solve farmer problems was not sufficiently meaningful in actual farming situations. But meaning could be negotiated by: (a) collaborative on-farm model evaluation by farmers and agricultural scientists; and (b) using the model flexibly in a 'what if' analysis and discussion (WIfAD). Farmers who originally considered models as 'toys for scientists' have referred to the benefits of the WIfAD as 'getting experience fast'. We further found that the WIfAD could be successfully conducted on the internet. This poster describes the background to the problem and the ongoing research.

Introduction

Dryland crop production is an important industry in northern Australia, but it is a hazardous enterprise due to an often dry and always highly uncertain climate. Substantial public funds are invested in scientific research to assist farmers in reducing risk in this industry, with much of this funding being invested in information technology based methods and tools. Early attempts at support used simulation models within decision support systems, but in spite of increased farmer computer ownership rates, DSS have not been adopted. We asked if this was because simulation of prospects in farming using historical weather records *cannot* aid farmers in planning and decision making, or because problem representations in DSS do not adequately match farmers situations. Research over several years to answer this question has shown that simulation can indeed be highly valued by some farmers if certain criteria are met, and the internet can play an important role in delivery of benefits. But the story is not simple, and agricultural scientists have become serious students of cognitive and social sciences in order to interpret their experiences in systems intervention.

The farming situation

The pristine soil resources in this region were so outstanding that a highly successful industry developed in spite of unreliable rainfall. But as farms became increasingly capital intensive and native soil fertility declined, financial risks have increased. Farmers plant opportunistically in almost any month, based on adequate water for planting. Follow-up rain is often uncertain. They manage this risk by fallowing to store water in the soil, but risks of serious soil erosion are high during fallows. Notably, in communities of expert farmers facing such a dominant production constraint, heuristics for probability judgements about rainfall are weakly developed. This could be considered a consequence of chaotic weather providing an *outcome-irrelevant learning structure* (OILS) (Einhorn 1982).

The scientific situation

Over thirty years of agricultural research accompanied by developments in computing technology has produced a capability to simulate important aspects of farming in response to weather, soil, and management. Simulated yields of major crops, as well as soil erosion and organic matter changes, have been shown to compare favourably with measurements in a wide range of field situations. Recent advances in seasonal weather forecasting mean that the Southern Oscillation Index (SOI) can be used to identify historical years that are analogous to the current one and thus temporally *situates* probabilities for decision making. The results of simulation studies producing normative farming strategies have convinced the scientific community that this has much to offer farm management, but the first major intervention effort has been disappointing. Elements of this present capability were packaged as decision support systems in the late 1980s but the impacts of these were sparse, modest, and brief. Our research had to address 'social' aspects of farm management in order to learn why.

On-farm participative research

Scientists embraced the paradigm of action research to work with communities of practice in communities of inquiry concerning decision making under risk. Several years of experience has shown that after a period of co-learning with farmers and their advisers (nearly all of which view models as 'toys' for scientists) simulation can be highly valued as a planning and decision tool, but only after certain conditions are met. One of these is that the simulator perform in the situation with a high degree of demonstrated realism. One condition for such performance is accurate specification for the situation. This has required adjustments to the representations of key processes by respective communities of practice of *farming* and *research*, and happened only after patient building of certain cognitive 'bridges' In each case, at some point in the interaction, a 'what if?' analysis and discussion (WIfAD) concerning farm management became the logical next step. Farmers have referred to the benefit of WIfAD as 'getting experience fast'. By provision

of a structured representation of the water environment as meaningful outcome probabilities, the OILS problem is overcome.

Some inadequacies of the 'standalone' DSS software approach have become apparent:

- DSS tend to produce 'plausible' results that are neither situated nor readily testable.
- Lack of situatedness is often a fatal barrier to perceived relevance and usefulness.
- The prevalent farmers' cognitive models concerning water supply and associated monitoring technique is incommensurate with the minimalist scientific model.
- Farmers prefer to delegate such systematic analysis to an adviser.

Provision of a supporting services using the Internet

The emergent approach from the on-farm work has led to a method of mediated decision support that we call FARMSCAPE (Farmer-Adviser-Researcher Monitoring, Simulation, Communication, And Participatory Evaluation) which is now being trialed in the commercial consulting industry. However, long distances are a deterrent to timely and affordable face-to-face interactions. We have developed a technique for interacting and holding WIfADs on the internet, that has been well-received by farmers, both because of reduced costs and high functionality. This technique involves farmers advises and researchers using software such as Microsoft's NetMeeting™ for sharing applications, and sending video and audio data. Participants are often dispersed geographically, separated by hundreds of kilometres. The content of these online interactions is directly analogous to traditional face-to-face session, but the costs of time and travel are reduced. The same technology will be central to delivery of a new training and accreditation program for consultants. And, in an adult education mode, we are undertaking a research project to pilot interactions on the Internet to facilitate the situated learning in farming practice that is needed for a farmer to come to see 'high-tech' FARMSCAPE as relevant and potentially significant to farm management.

References

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Notes:

In the poster session we aim to share our experiences in holding highly situated internet based learning experiences for farmers. We hope to learn from other participants about supporting collaborative learning via the internet. This is designed to be an interactive poster. This will form the content of a multimedia poster including video, interactive elements, animation and real-time web based sessions. It will be designed in such a way that a presenter can talk to it, as in a presentation; but also be used as a standalone 'multimedia kiosk', when unattended.