

## **Gathering and sharing crop science knowledge in a global community of practice**

**Roger Johnson**

The Regional Institute Ltd, [www.regional.org.au](http://www.regional.org.au)

### **Abstract**

Free and open access to crop science knowledge is essential for reducing poverty and addressing environmental issues. The Internet can bring information and people together from around the globe to build knowledge at local and regional scales. For the Internet to be an effective decision support system for farmers, extension agents and researchers, relevant information must be available online in an accessible and usable format.

Through journal publishing and conference activities, professional societies play an important role in the creation and dissemination of new scientific knowledge in society. Leading up to the 4<sup>th</sup> International Crop Science Congress in Brisbane, 2,600 authors, reviewers and editors from 90 countries contributed papers and interacted online to organise, review and publish more than 5,000 pages of the latest crop science knowledge at [www.cropscience.org.au](http://www.cropscience.org.au). By adopting open standards and guidelines for managing information in electronic formats, professional society members can be empowered to self-publish and extend their knowledge to a global audience via the Internet.

### **Media summary**

For the first time in the history of crop science research, the collective knowledge of the international crop science community has been brought together in a single, freely accessible online resource.

### **Keywords**

Extension, Internet, Decisions Support Systems, agricultural, knowledge systems, open source, online, accessibility, usability.

### **Introduction**

Worldwide, 600,000 agricultural extension agents are employed to extend knowledge to 1,200 million people engaged in farming activities, attracting more than \$6 billion in public funding (Alex et al 2002). Poverty reduction and addressing environmental issues are key pressures for a change in public extension (Alex et al 2002).

In Australia, there has been a trend in extension policy away from information and technology transfer approaches towards participatory and social learning activities (Carberry, 2001, King, 2000). Farmer learning in group extension activities depends on the quality of inter-personal interaction (Roberts, 2000) and its effectiveness for widespread involvement is limited (Marsh and Pannell (2000). Decision support systems and the Internet have a long history of ad-hoc promotion and indifferent acceptance as extension tools (Hargreaves and McCown 2000). Few of the publicly funded extension programs analysed from a two-year national review of extension and education across Australia (Coutts and Roberts, 2004) provide useful supporting web-based information.

There is a logical continuum in the extension domain across genre, through time and from place to place that, through institutional indifference or neglect (Carney 1998), has been fragmented (Fulton et al 2003). Two important genres of information contributed by learned societies, scholarly journals and conference proceedings, are largely excluded as a potential resource for farmer learning. Scholarly publishing has been the established formal mechanism for the creation and dissemination of new scientific knowledge in society for 300 years (ref). Conferences provide professional communities of practice with a regular forum for reporting the latest knowledge and interaction. While institutions are the subject of much review in the

extension literature (Fulton et al, 2003; Keen and Stocklemeyer, 1999), the role of societies in extension receives little recognition.

The 4<sup>th</sup> International Crop Science Congress brings together members of the Australian Society of Agronomy, the Asian Crop Science Society and other professional societies from around the world. A key aim of the congress was to make the knowledge from this large and important gathering of the crop science community freely accessible in particular to developing nations.

This paper describes a knowledge management system for communities of practice to self publish online using common proprietary desktop software and a peer reviewed online publishing system developed using open source software.

### **The importance of equitable access to crop science knowledge**

Participants at the 3<sup>rd</sup> International Crop Science Congress recognised the central importance of access to science-based knowledge:

*“Strengthening agricultural research and education at national and international level is a prerequisite to fulfil future human needs ...failure of the world's agricultural scientists to communicate this message would be an abandonment of one of their most important professional and ethical obligations.”*

Hamburg Declaration, 3rd International Crop Science congress, 2001

The challenge of harnessing crop science knowledge to address global issues was stated clearly:

*“A massive amount of information is now quickly available. However, there are few mechanisms to enhance the access of poor countries to information and to help decision-makers to sift through the significance and applicability of bewildering and often contradictory data. We are concerned that information resulting from scientific research is not adequately shared and spread, and that the information tools used are not always the most appropriate ones.”*

Louise O. Fresco, 3rd International Crop Science congress, 2001

With the increasing level of education in the farming community, and with the active role that members of professional societies play in on-farm extension and widespread access to the Internet established, equitable access to scholarly journals and conference proceedings by extension agents and farmers should provide a complimentary genre of value added information to support extension.

Researchers derive income from the scientific impact of their reported findings “how much they are read, cited and built-upon by other researchers”, rather than through any commercial value of the information. The volume of this “give away” literature (Harnard, 2000) is growing exponentially and is of significant potential benefit to the global extension effort. Yet, due to commercial interests (Houghton 2000), most research reported in journals and conferences is inaccessible even to most researchers (Harnard, 2000).

If we are to meet the global challenges of reducing poverty and addressing environmental degradation, we must change the way knowledge is transferred.

### **An online community publishing model**

In 1998, the Australian Society of Agronomy decided, due to high cost of printing and limited access to the information, to move publication of its proceedings online. A method was developed to automate the conversion of the papers submitted by authors in Microsoft Word format to HTML format (Johnson 2001). Authors were provided with a standard Word template to encourage simplicity in presentation and facilitate structured markup. The proceedings of the 8th, 9th, 10th and 11th conferences are now freely available online at [www.agronomy.org.au](http://www.agronomy.org.au).

*Word as a publishing standard*

The Word template establishes a baseline standard for authors to submit papers in a consistent format. Authors structure their documents, making it practical to convert the papers to an accessible HTML format, rather than relying on the print format, PDF with its inherent online usability constraints. An online publishing system was developed using Open Source software ([www.opensource.org](http://www.opensource.org)) to facilitate the submission and review process via an Author Gateway and to overcome the logistical problems of managing submission via email. Members of other societies including the Australasia-Pacific Extension Network, the Australian and New Zealand Soil Science Societies also share this common platform.

#### *Web publishing – a new tool for extension*

Three principles were established in developing the open web publishing system:

- Open source software was used to reduce cost of development and enables access to the skills of a worldwide community of developers (eg [www.sourceforge.net](http://www.sourceforge.net)).
- Open access to the information results in a service not a product for sale as the information is given away once the cost of first copy is met.
- Open standards mean that information can be created and organised using popular desktop formats (Word, Zipfile) for publication to PDF (print) or HTML (Web).

#### **Recognising roles and responsibilities in online publishing**

For the 4<sup>th</sup> International Crop Science Congress the following roles and devolved structure were defined: administrator and technical editor (2), scientific editors (2), assistant theme editors (6), reviewers (150), and registered authors (1,000). More than 1,000 papers comprising some 5,000 pages were submitted by 2,600 collaborating authors from 90 countries via an online Author Gateway.

The Author Gateway allowed authors to register their details, access the template and submission guidelines and upload their paper. A unique number was assigned to each document. New versions submitted by authors or reviewers were automatically archived.

Peer review provides quality control. Papers were reviewed for appropriateness and readability, as reports of current research or reviews of important developments in crop science research. without the rigour required for a journal. Reviewers were assigned multiple poster papers or single invited papers that could be downloaded, reviewed offline using track-changes in Word and uploaded with recommendations and comments for editors.

Scientific editors tracked the status of the papers via the Author Gateway's document tracking system. Reviewed papers were selected by theme and bundled into a zip file for download, editing and bulk upload back into the document database. Author and document details were downloaded as CSV files for opening in Excel and re-imported into the system as changes to theme allocations were made. Editors approved papers uploaded by reviewers for publication.

The publishing model recognises the primary role of authors as contributors and publishers of new scientific knowledge. Authors retain copyright and their latest research findings remain freely accessible as an extension resource. The online document management repository gives all users of the system, controlled access to the same set of papers for all participants according to their roles and responsibilities. Users are added to groups with permission to access resources on the system. Administrator and editor groups can manage users and documents to suit the tasks required.

The entire publication was organized online and edited in Word by remote users before downloading and converting to HTML and PDF for CD and Web publication. The electronic publishing process reduces complexity and cost by eliminating the page layout and pagination requirement of print publication. The structural style elements in Word were used to automatically generate a handbook of abstracts and an author index for output to PDF and HTML.

#### **Benefits of electronic publishing for societies**

Societies and their members are empowered to self-publish and open up public knowledge to people who will most benefit from it - farmers, extension agents and people in developing countries. The shared platform gives all participants an equal role in the publishing process.

Some other benefits include:

- Authors learn to improve their information management skills and contribute knowledge online.
- The publishing process is integrated with the society website.
- Societies can share a common platform to exchange information and achieve economies of scale.
- The online peer review process can be used to for conference as well as journal publishing depending on the standard and rigour of the review process.
- The links between scholarly publishing conference activities and extension are strengthened
- Information can accessed freely online in HTML using any browser and on older computers.
- A well-structured online feedback mechanism allows the correspondence data to be linked to author and paper details rather than via email. Reducing email traffic eliminates one of the most time consuming parts of the process.

## **Conclusion**

The decision to give way the latest crop science knowledge gathered for the 4<sup>th</sup> International Crop Science Congress and publish it in accessible HTML format on the Internet, provides equitable access by people in developing and developed countries.

The open web publishing approach reduces the cost, complexity and the time involved by moving the process online and distributing the publishing effort. Funding institutions should give greater recognition to the role of authors, reviewers and editors in adding value to crop science knowledge for extension and provide incentives to contribute to open access, online publications.

Extension policy must embrace new and innovative ways to gather, organise and share knowledge on a global scale. By changing the way we manage knowledge we are better equipped to meet the global challenges of reducing poverty and addressing environmental degradation.

## **References**

Alex G, Zijp W, Byerlee D, and others (2002) Rural extension and advisory services: New Directions. Rural Development Strategy Background paper #9. Washington D.C. Agriculture & Rural Development Department, World Bank.

Bamberry GT Dunn A (199&) A pilot study on the relationship between farmer education and good farm management. Rural Industries Research and Development Corporation, Canberra.

Carberry (2001) Are science rigour and industry relevance both achievable in participatory action research? In: Proceedings, 10<sup>th</sup> Australian Agronomy Conference, Hobart.  
[www.regional.org.au/au/asa/2001/plenery/5/carberry.htm](http://www.regional.org.au/au/asa/2001/plenery/5/carberry.htm)

Coutts J and Roberts K (2003) Models and Best Practice in Extension. APEN National Forum, 26-28 November 2003 Hobart. [www.regional.org.au/au/apen/2003](http://www.regional.org.au/au/apen/2003)

Fulton A, Fulton D, Tabart, T, Ball P, Champion S, Weatherly, J and Heinjis D (2003) Agricultural Extension, Learning and Change RIRDC Publication No 03/032.

Hargreaves D and Hochman Z (2004) FARMSCAPE Online Interactive Internet support for farmers' situated learning and planning. RIRDC Publication No 04/048.

Harnad, S. (2000) For Whom the Gate Tolls? How and Why to Free the Refereed Research Literature Online Through Author/Institution Self-Archiving, Now  
<http://www.cogsci.soton.ac.uk/~harnad/Tp/resolution.htm>

Houghton 2002, *The crisis in scholarly communication: an economic analysis*, e-volving Information Futures, VALA2002. <http://www.vala.org.au/vala2002/2002pdf/16Houghton.pdf>

Johnson (2001) Word to Web publishing for Agricultural Research. 10th Australian Agronomy Conference  
[www.regional.org.au/au/asa/2001/5/a/johnson.htm](http://www.regional.org.au/au/asa/2001/5/a/johnson.htm)

Keen M and Stockmayer S (1999) Communicating Research: An Overview of Communication Efforts of Rural Industry Research Funding Bodies RIRDC Publication No R99/54

King C (2000) Systemic processes for facilitating social learning. Doctoral Thesis. Uppsala.

Marsh, S.P. and Pannell, D.J. (2000). Agricultural extension policy in Australia: The good, the bad and the misguided. *Australian Journal of Agricultural and Resource Economics* 44(4): 605-627.

Roberts K (2000) J. An analysis of group processes in farmer learning: the Australian experience. *Agricultural Education and Extension* 6:4 pp235-244