Network analysis: a first for grains industry highlights strengths and opportunities

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Key messages

• This network analysis is the first of its kind for the grains industry in Australia.

• The information network is characterised by 'nodes' or 'gateways' associated with individuals or organisations through which information is channelled.

• There are opportunities for increased inter-connectedness across the information network in the grains industry to broaden the flow of information.

Aims

Network Mapping is a process that enables people to examine, analyse and deconstruct a visual representation of a system, thereby identifying its structure, strengths and weaknesses. This process is a key to improving the efficiency, effectiveness and innovation within a system. It provides a 'lens' that exposes the interactions between people within a system, allowing for the exchange of information and knowledge to surface, and thus, exposing dependencies and gaps within the system.

Access to appropriate, quality information, its critical evaluation and knowledge about how best to implement farming system options in a regional context rely on strong information networks within, between and beyond farming regions. An investigation of the nature and strength of information networks, as they relate to farm adaptation in Australia, was conducted in conjunction with collaborating farmers from eight districts in different agroecological zones across Australia.

Method

Network maps to provide a visual representation of information networks in the Australian Grains Industry were generated based on the responses of farmers from the participating groups as well as individuals who represented GRDC, government agencies and consultants/advisors from the local districts. The network maps were built from responses to a survey, and represent a snapshot in time.

The survey comprised a questionnaire that was sent out electronically to 170 individuals. The questions in the questionnaire were based on six key themes related to information networks around farm adaptation. The themes were:

- aspects of Farm Production (e.g. agronomy and animal production);

- seasonal Forecasts (e.g. projection, interpretation and use of such forecasts) and Climate (e.g. climate interpretation and climate change);

- farm Diversification (e.g. new or alternative enterprises or land use diversification);

- farm Technology (e.g. precision agriculture, data handling and robotics);

- farm Financials (e.g. farm budgets, economic planning and financial investments); and

- community and Social Matters (e.g. anything external to previous themes which occur in order to enhance and retain the community - meetings, events, social occasions).

For the purposes of generating the information for the network maps, the surveys comprised a selection of profile questions and perception questions. The profile questions ascertained details of location, organisation, size and type of farm business, years in the agricultural industry and age, which enabled the filtering of the maps. The perception questions asked respondents to rate "how important is the insight/advice that you receive from <<person>>" for each of the six themes described above. The question was answered for 5-10 people (<<person>>) whom the respondent

selected from a list of the people who had received the questionnaire (to which respondents could add further names, if necessary).
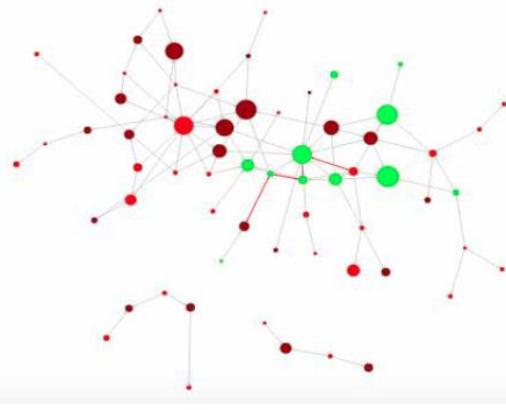
Network maps were created from the responses and were displayed in an interactive format on the specially constructed "Grains Industry Network Mapping Platform" (http://grainsindustrynetworkmapping.net.au/index.php). This platform contains instructional videos on how to use the maps, reports on Network Mapping and the network maps.

Results
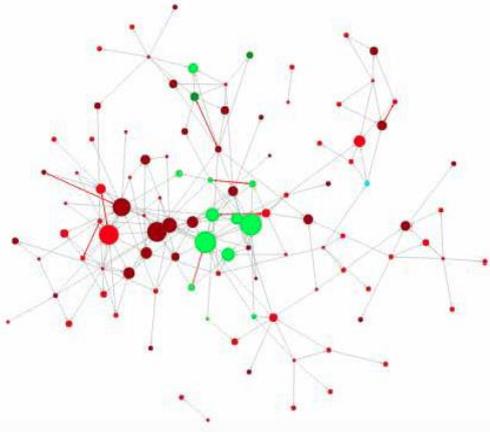
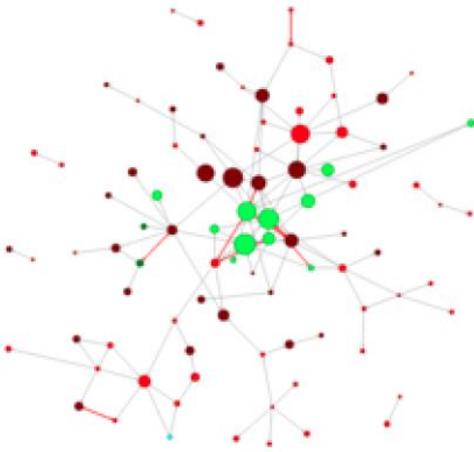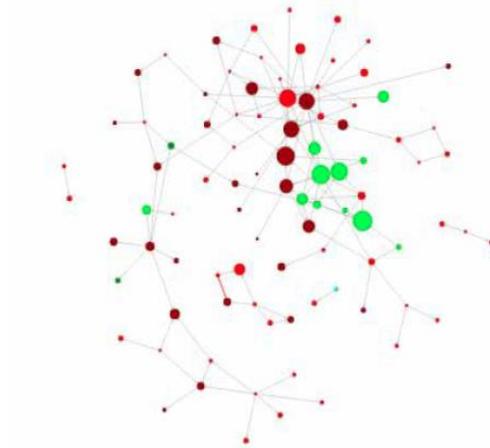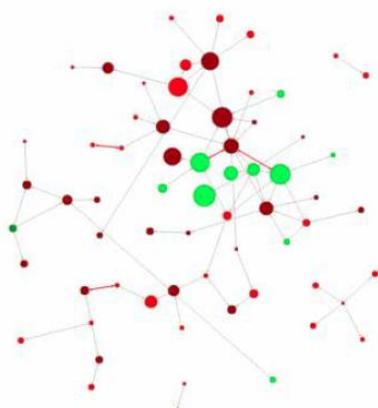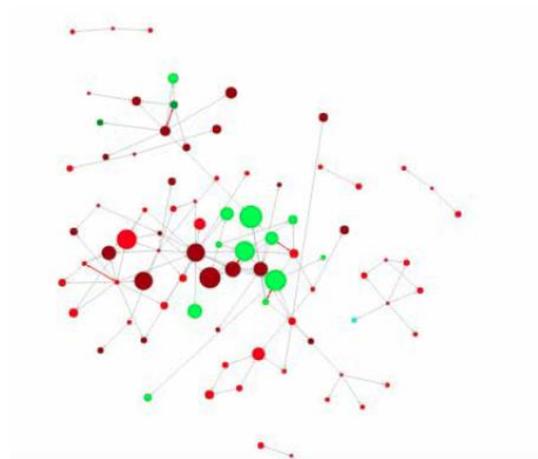**Figure 1.** Network map for a) aspects of farm production, b) seasonal forecasts c) farm diversification, d) farm technology, e) farm financials and f) community and social matters. Members of farm groups are indicated in red, consultants/advisors in maroon, universities in blue, GRDC in dark green and government agencies in light green.

The network maps highlighted the network connections amongst members of grower groups and between grower groups and consultants/advisors (Figure 1), but there were some grower groups working in isolation with regard to farm production, for example. State-based clusters were another feature of the maps.

Members of government agencies had connections to consultants/advisors, but were less-well connected to the grower groups. Government agency groups were central to the information networks relating to seasonal forecasts, farm diversification and, to a lesser extent, farm technology. Connections were then made via consultants/advisors to growers, although some grower groups connect to one other, but do not connect to consultants/advisors.

The information network map for farm financials showed clusters of grower groups connected only to each other with some also connected to a consultant/advisor (Figure 1e). Grower groups seemed more isolated in this area. As would be expected, there are strong clusters of grower groups in this network map of community and social matters (Figure 1f).

Conclusion

Farmers involved in this project had previously identified access to information (and its quality) as an important challenge to adaptation (e.g. Fisher et al 2014). This network mapping process highlighted some important findings related to this aspect. The strong links between consultants/advisors and growers/grower groups regarding production aspects of the business is to be expected given the changes over the past 20-or more years from state-agency based extension to a private sector model. However, there are opportunities for improved connection between grower groups in order to encourage 'best practice' and innovation. This is increasingly important with the increased involvement of grower groups in hosting research projects or carrying them out directly.

There are opportunities for increased inter-connectedness across the network to broaden the flow of information and to remove 'nodes' or 'gateways' associated with individuals or organisations through which information is channelled. The traditional, established flow of information from members of government agencies to growers via consultants/advisors was evident in relation to seasonal forecasts, farm diversification and, to a lesser extent, farm technology. Connections existed between some grower groups, but these were to the exclusion of, rather than in addition to a connection to consultants/advisors.

The relative disconnectedness of the network regarding information associated with farm finance represents an opportunity for the grains industry. The assessment by the participating growers that financial capital is constraining adaptation (Fisher et al 2014) adds further emphasis to this point. To be sure, part of this assessment related to cash-flow associated with challenging seasons, but long-term profitability needs to take account of seasonal fluctuations. Economic analyses demonstrated that the implementation of options that are within current and evolving practice were able to maintain farm profitability under the challenge of a reduction in the background level of production (Fisher and Tozer 2016, these proceedings). Financial information is often considered to be private, proprietary or specific to each business, but the benefits of growers sharing information has been demonstrated elsewhere in the world.

Access to appropriate, quality information, its critical evaluation and knowledge about how best to implement options in a regional context rely on strong information networks within, between and beyond farming regions. Opportunities to improve information networks abound. Increased inter-connectedness across the network might be afforded by the use of social media, particularly those allowing presentation of more detailed, longer lasting information such as websites with a discussion board, blogs and facebook sites, rather than more ephemeral media. Links between groups may be facilitated by communication between individuals, formal meetings, conferences, field days, participation in on-line groups or discussions that are dedicated to sharing information around specific topics. Improved inter-connectedness of the industry networks, particularly between grower groups and between these groups and other industry participants is increasingly important with grower groups' increased involvement in hosting research projects or carrying them out directly.

The network analysis completed as part of this project was the first time that such an analysis has been done in the grains industry in Australia. Strengths and weakness were identified in the sample of the industry network described. Cross-linkages do exist, but not across the complete range of topics examined and the existence of information 'gateways' and the possibility that individuals or groups may be working in isolated information 'silos' are threats to the effective transfer of quality information.

The results of this analysis point to the benefits of wider network analysis of the entire industry. This would be particularly important at such a key point in time when the delivery structures are changing due to major re-structuring of public institutions and the joint industry response.

References

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Key words

network analysis, Australian Grains Industry, farm adaptation, visualisation

Acknowledgments