A consultation process for developing an innovation agenda for Regional Water Productivity in Australia: the case of a fledgling innovation platform in research

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Abstract: Research in innovation studies suggests that appropriate starting conditions are required if alignment of research to practice and policy is to be enabled. To achieve this alignment, a scoping exercise is required and must involve those people and institutions that have an interest or stake in the research. This paper describes a consultation process to develop an Innovation Blueprint for Regional Water Productivity in Australia through a new research initiative at the University of Melbourne. This Blueprint was developed through a two-stage consultation project in which opportunities and constraints for innovation in regional water productivity in Australia were identified and discussed with key stakeholders without pre-empting research or development questions. Firstly, we conducted an online survey of water sector stakeholders using a Delphi methodology. Then the findings of this survey were considered and augmented in discussions with key experts in a stakeholders' workshop. In this paper we ask: How did this consultation process constitute a platform for innovation in research? And, what is the potential of this platform to provoke or drive institutional change? We suggest that a platform for innovation in research does emerge from this consultation process, however, the potential for institutional change from it will depend on continued deliberation in new routines of research-development practice, and the formalisation of new partnerships between researchers and other water sector actors. In aiming to progress innovation in water productivity, we also suggest that organisations such as the University of Melbourne and its partners need to invest in such platforms as a pre-requisite to creating practice and policy change through research.

Keywords: platform for innovation; regional water productivity; new research practices; consultation process

Introduction[24]

Exploring platforms for innovation in research

Scholars of innovation systems recognise an ongoing tension between a systemic view of innovation and one that posits innovation as an adoption and diffusion process (Nettle et al., 2013). Conventional perspectives on innovation, such as 'linear' or 'pipeline models', emphasise that innovation constitutes the delivery of science-based technologies (derived from research settings) to ultimate end users (Röling, 2009). An innovation systems perspective, however, understands innovation as a process of socio-technical change (Kemp & Rotmans, 2005 (Geels, 2004)) which

[24] Globally, scholars of innovation systems recognise innovation as a process of that is socially and territorially embedded and culturally and institutionally contextualized (Lundvall, 1992). Along with this realisation comes the concept of innovation systems (Kemp & Rotmans, 2005). The main idea underlying this concept is that innovation cannot simply arise from research and development initiatives (R&D) through a linear flow from science to new product. On the contrary, innovation from a systemic perspective emerges by the interaction of different parts or components making up a system (Kemp & Rotmans, 2005).

is both performed in, and performative of, new linkages, new knowledge, new rules/roles, and new coalitions and organisations (Markard & Truffer, 2008:1).[25]

In this paper we take innovation to be an emergent process of production of new social arrangements, new symbolic practices and new materialities (e.g. products) (Suchman, 2003) While some scholars identify innovation as an emergent property of interaction among social entities (e.g. stakeholders) (Roling, 2006), we seek to emphasise the inherently heterogeneous nature of innovation as the 'work' or sustained effort of coordinating and managing diverse people, products and representations in particular times and places. Here we take inspiration from science studies scholars and, in particular, proponents of Actor Network Theory (ANT) (Callon, 1986 ; Latour, 1987 ; Law, 1999 ; Verran, 2002) who posit that social, material and symbolic practices (Shapin & Schaffer, 1985) are all equally or ('symmetrically') important in performing (Law & Singleton, 2000b ; Mol, 2002) the objects, realities and possibilities of our worlds.

In seeking to better understand how to enable and support innovation, scholars of agricultural innovation and more recently, policy makers (Hounkonnou et al., 2012), have developed the metaphor of 'platforms for innovation' (Roling, 1994 ; Ison et al., 2012) or 'innovation platforms' (Hounkonnou et al., 2012). Platforms for innovation are understood as configurations of social elements (social networks, institutional arrangements etc) that enable innovation and, in particular, contain the possibility of enabling institutional change. In this paper we describe the development and operation of a consultation process for innovation in research within a new initiative at the University of Melbourne, called Carlton Connect. We ask: is this process a platform for innovation in research? In asking this question we are concerned with whether this process contained the possibility of doing research differently—in other words, did it enable or perform innovation in research? In asking these two questions, we aim to add to current knowledge on the key practices and challenges of designing platforms for innovation in research.

The case of innovation in regional water productivity (RWP) in Australia

The Australian water sector has undergone a period of rapid change over the past ten years. Prompted by water scarcity, inefficient irrigation practices and environmental degradation of catchments, the Australian Government instituted a major reform effort in 2004, the National Water Initiative. It is within this context that Australian governments, communities and the water industry are seeking new ways of understanding and managing water for a range of cultural, societal, environmental and economic benefits. This is a significant innovation challenge for all these groups of actors and one that must also be addressed by research institutions as they seek to play a role in generating new knowledge and practices for water use and management.

Innovation in the water sector necessarily demands long-term and effective linkages between research and practice or between knowledge and action (Cash, et al., 2003). In Australia, where water issues are being historically framed by the resource's temporal and spatial availability, the need for water innovation is critical. The country's extreme climatic conditions—which range from seasonal droughts to severe floods—frequently alter river flows and groundwater recharge, leading to an extremely variable availability of freshwater to both the environment and population (McKay, 2005). In light of this, Australian policy reforms over the past decade have made significant improvements in addressing challenges linked to the access (determined by variability) and allocation (determined by the complexity of multiple water uses such as social, economic, environmental and cultural) (McKay, 2005) of water. However this work is far from complete and much remains to be done across urban and rural Australia to improve the productivity of water resources (Godden, et al., 2011).

[25] The multiple dimensionality (or systemic) nature of innovation is expressed by the range of components that have to be enabled and need to interact to each other in order to achieve change (Foxon, et al., 2005).

This paper reports on a research project with the explicit aim of generating new thinking and research practice to enhance water productivity in regional Australia. This (applied) research project involved the development of a consultation process as part of a new approach by the University of Melbourne to working with industry and communities on sustainability issues. This new approach is embodied in the University's Carlton Connect initiative (see http://carltonconnect.com.au/) and in particular its flagship Regional Water Productivity[26] (RWP) Innovation Hub.[27] This project formed part of the RWP Innovation Hub activities and aimed to identify the major factors opportunities and constraints to improving societal (including environmental) benefits from water from the perspectives of researchers, industry, practitioners and communities. These opportunities and constraints were used to inform the development of an agenda for innovation in RWP. This agenda is represented by a draft Blueprint for Innovation in Regional Water Productivity which is currently being finalised by the Office of the Vice-Chancellor of Research (The University of Melbourne).

Methodology

The research reported in this paper involved two main methods for engaging diverse participants in developing an innovation agenda for regional water productivity.The first was an online survey in two rounds using an adapted Delphi method. An adapted Delphi method was used to conduct a survey of expert professionals and practitioners in water resource use and management. This method was developed at the RAND Corporation in late 1950s with the objective to collect and synthetise experts' judgements (Okoli & Pawlowski, 2004). Since its first application, this method has been used by a diverse range of disciplines and topics mostly linked to planning, decision-making and policy research (Gordon & Pease, 2006) and applied to generate solutions and analysis of complex problems (Alexander, et al., 2010). The approach is useful in decision and research contexts where values are disputed and/or where interests are contested (Funtowicz & Ravetz, 1993). In contrast to conventional methods of inquiry, post-normal methodologies like Delphi help to deal with research and decision settings with unknown factors and high levels of uncertainty (Mayumi & Giampietro, 2006).

The Delphi method is an iterative process of expert elicitation and consultation (Thomson, et al., 2009) for defining and analysing complex issues (França Doria, et al., 2009). It is a method for structured group communication that formally integrates multiple and conflicting views allowing consensus to rise regarding particularly contentious and multidimensional problems (Alexander, et al., 2010; Moore, et al., 2009). Even though the method encompasses many variants, the main features account for: application of an standardised questionnaire; anonymity of participants; equal opportunity of all incumbents to participate; iteration (at least two rounds); management and consolidation of views by a facilitator/s; the opportunity for participants to review their own and others' comments (feedback loop); and statistical aggregation from individual answers to group answers (Elmer, et al., 2010; de França Doria, et al., 2009; Gordon & Pease, 2006).

We chose to adapt the Delphi method to an online survey which aimed to canvass a broad range of expert views on opportunities and constraints to innovation in RWP. Following Moore et al. (2009), we applied the Delphi method with an emphasis on collecting multiple and contesting arguments from water sector stakeholders, rather than necessarily building consensus or agree-

[26] Regional Water Productivity (RWP) is defined here as: 'the combination of outcomes produced, such as food, fibre, income, social well-being and ecological benefits, and the social, economic and environmental costs incurred per unit of water used'. (RWP Innovation Round 2 Survey unpublished report 2013).

[27] One of the key challenges recognised by the Carlton Connect initiative is that of improving regional water productivity: 'Australia's role as a global food producer, the sustainability of urban and rural communities, and the balance of our ecosystems rely on the effective management of our water systems. This challenge is intensifying due to a rising populationand a changing climate' (see http://carltonconnect.com.au/).

ment. This is consistent with the application of this method defined as Policy Delphi (Ibid.) or Argument Delphi (Kuusi, 1999). As the Delphi method does not require statistical sample design, we selected participants following a non-probability sample, specifically a convenience sample (Bryman, 2004). Our sample comprised a mixture of key water sector actors from academia, government, industry and communities across Australia. The list of contacts was generated from existing databases. Our sample design focus was to canvass different communities of practice in water use and management; different jurisdictions (e.g. Australian states and territories); and different river/catchment systems (e.g. tropical and temperate), thus seeking to represent as much as practicable the spectrum of water use and management in Australia.

As Figure 1 shows (see below), the first round of the survey on 'Regional Water Productivity and Innovation' (April 2013) was framed as a 'brainstorming' exercise, with open-ended questions on: a proposed (working) definition of 'regional water productivity'; the main opportunities and constraints to improving the current status of RWP; the relative importance of different innovation domains and activity areas to achieving transformation in RWP; and opinions on a proposed conceptual framework for innovation in regional water productivity. This first round thus involved mainly forecasting by both seeking consensus (e.g., on levels of agreement on the definition of 'regional water productivity'); and different or more 'extreme' views from respondents. A total of 288 people were invited to participate in the initial round of the questionnaire. Ninety-two positive responses (32% of response rate) were obtained. Questions for the first round were developed through a collaborative and iterative approach with researchers in the RWP Innovation Hub (of Carlton Connect) including individual elaboration to group validation on the quality and accurateness of questions (involving all research team members).

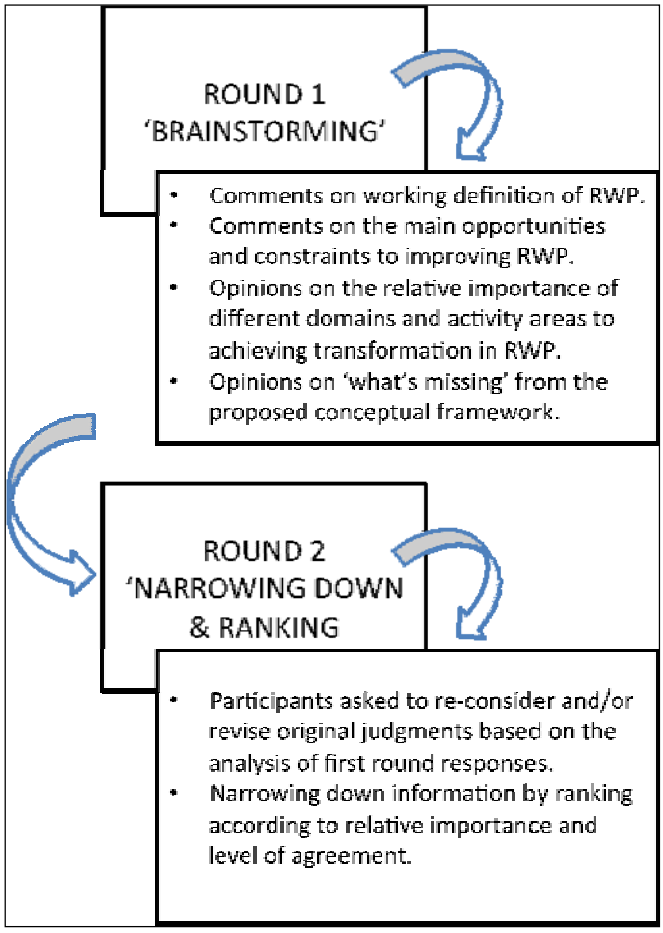
Qualitative and quantitative information obtained in the Round 1 survey was analysed providing a summary of responses (expert judgements) in a written report. While the first round included a mix of close and open-ended questions, Round 2 was primarily based on close-ended questions. In Round 2, the questionnaire was sent to those 92 participants from the first round and 61 agreed to participate (66% response rate). In the second round of the survey, participants were asked to re-consider and/or revise their original judgments based on the analysis of first round responses. The second round sought primarily to narrow down and rank information (according to relative importance and level of agreement). In each survey round, questions were peer-reviewed by members of the R & D Advisory Team for the RWP Innovation Hub and by two expert reviewers.

The second main component of the consultation process to inform the innovation agenda for RWP was a Regional Water Productivity and Innovation Stakeholder Workshop held on19th September, 2013. This workshop brought together a range of key industry, community and government stakeholders with University of Melbourne (Carlton Connect RWP Innovation Hub) researchers to consider the results of the online survey and further refine key ideas for improving and progressing RWP.

Figure 1: Water Productivity Blueprint consultation process (Stewardson et al., 2014).

	Round 1 survey	Topic workshops	Round 2 survey	Final workshop
Purpose	Canvass views on the ideas and priorities for innovation in regional water productivity	Filter and refine the broad range of responses from the round 1 survey	Test and rank the findings from the round 1 survey and topic workshops	Confirm and refine the innovative ideas that emerged through the Delphi process
Structure	Conducted using SurveyMonkey, consisting of closed- and open-ended questions (many deliberately provocative)	Six topic specific workshops • River Control Systems • Computational Methods for Environmental Water Management • Innovations in Water Management • Water markets • Spatially-enabled Water Information • Research and Development	Conducted using SurveyMonkey, consisting of 41 close ended questions presenting qualitative statements/opinions provided in round 1 and organised across domains or areas of interest	Workshop participants were presented with the collated outcomes of the two surveys and topic workshops and asked to test and confirm the responses
Participants	• Invitations sent to water sector professionals and practitioners • 91 representatives completed the survey	• Subject matter experts and practitioners	• Invitations sent water sector professionals and practitioners • 61 representatives responded	Participants were chosen to represent a similar mix of discipline and geographic diversity as had engaged with the online surveys and earlier workshops

Figure 2: Adapted Delphi survey process.



The third key component of consultation in the agenda setting process was the Strategic Advisory Committee established for the RWP Innovation Hub. This Committee met four times during the process (in 2012/13) and provided advice and comment on both the process itself and the draft Blueprint for Innovation in Regional Water Productivity (the Blueprint) (produced in November 2013).

The outcomes of the survey and the workshop informed the development of the draft Blueprint. This document was drafted by members of the RWP Innovation Hub Research and Development (R & D) Advisory Committee[28] and endorsed by the Strategic Advisory Committee for the RWP Innovation Hub which is made up of senior bureaucrats from federal and state government agencies with responsibilities for water management and use.

Results and Discussion

Ideas from water sector stakeholders on innovation in regional water productivity: examples from a survey and workshop on innovation in RWP

Both the survey and workshop on RWP innovation, developed as part of the innovation agenda setting process for the Carlton Connect RWP Innovation Hub, produced rich and voluminous information on opportunities and constraints for improving RWP in Australia. It is beyond the scope of this paper to present the survey and workshop results in detail. However, some principle findings are noted here to illustrate how the consultation process enabled novel thinking, established new social arrangements and enrolled particular material resources for 'progressing innovation' (Nettle et al., 2013) in RWP.

In Round 1 of the survey on 'RWP and Innovation' respondents were asked to consider a conceptual framework for innovation in RWP. This framework was based on a systems perspective of innovation in water use and management and was developed from the literature (Asheim, 2011 ; Wieczorek & Hekkert, 2012) and in discussion with RWP Innovation hub researchers. It was used as a basis for structuring mainly open-ended questions about the relative importance of, and opportunities and constraints related to 'innovation domains' and 'innovation activity areas' in RWP. The structured questioning process of the survey was also designed to reveal 'outlying' or more radical visions and ideas for change.

The conceptual framework for 'innovation in RWP' was modified according to both Round 1 and Round 2 survey results and from feedback at the stakeholder workshop for RWP Innovation. Table 2 below shows the evolution of this framework at the level of 'innovation domains' in three stages. Final rankings of the relative importance of different 'innovation domains' to improving RWP were obtained in Round 2 of the survey and provided an indication of priority areas for further discussion in the subsequent stakeholder workshop and in drafting the Blueprint document.

[28] The R & D Advisor Committee was made up of the lead researchers in projects funded by the University of Melbourne under the Carlton Connect RWP Innovation Hub including the research that is the subject of this paper.

Table 1: Innovation Domains and Activity Areas in Regional Water Productivity: Round 2 survey rankings of 'essential' and 'high priority' (aggregated) to achieving improvements in Regional Water Productivity

Innovation Domain and Ranking	**Innovation Activity Areas and Ranking**
Governance (48%)	Effective water policy development and implementation (91%) Recognition and use of scientific, indigenous and local knowledge (80%) Effective water rights frameworks (77%)
Research and Development Systems (45%)	Definition and prioritisation of practice and policy-relevant to R & D (89%) Research well aligned with policy practice (86%) Well targeted government investment (86%)
Water Use and Practices (41%)	Environmental waster use and management (86%) Irrigation water use and management (80%) Better water use and re-use (77%)
Education, Training and Communication Systems (30%)	Development of skills and knowledge to use, manage and trade water (82%) Development of skills and processes to develop and implement evidence-based decision making (82%) Enhanced mechanisms to support collaboration (61%)
Infrastructure and Information Services (30%)	Effective practices for evaluation, reporting and prediction of water services (75%) Water accounting (70%) Modernisation of water delivery infrastructure on-farm and in-channel (64%)
Water Planning and Operations (25%)	Adaptive water planning (84%) Effective water accounting (73%) Risk management (73%)
Economic and Market Systems (16%)	Water pricing and markets (73%) Valuing non-monetary costs and benefits (73%) Definition of multiple coasts and benefits (73%)

Qualitative statements (survey responses) on opportunities and constraints to improving RWP were also obtained in Round 1 of the survey. These were thematically analysed according to the initial conceptual framework for 'innovation in RWP' and 'outlying' elements identified. Through a question[29] aimed to provoke respondents to 'think outside the box' and provide more 'extreme' views on what the outcomes of successful transformation in regional water productivity might be, additional ideas on desirable future change in RWP (qualitative statements) were identified by respondents. Overall, these ideas were consistent with the main opportunities and constraints to improving the current status of regional water productivity identified by respondents in the earlier section of the survey. This consistency was, in particular, related to: the recognition, application and articulation of the multiple values and uses of water; developing approaches for quantifying costs/benefits of social, environmental, cultural and economic aspects of water under variability and uncertainty (e.g. through improved research and development and governance); and, collaboration across industry, government and communities in managing water. Specific examples included:

[29] The question was: Having thought about the current opportunities and constraints for change in regional water productivity, we would now like you to consider what some of the future possibilities for change or transformation in this area might be. As a result of influences such as climate change, world food demand, and the changing nature of farming, there is an opportunity to recognise and re-imagine our multiple uses and values of regional water. New and different food systems, new connections between urban and rural communities and new ways of managing our shared resources will emerge from exploring the possibilities for transformational change in water together. What are the possibilities for transforming regional water productivity? We would like you to imagine that it is 2030 and Australia's regional water productivity has improved far beyond what anyone had imagined was possible back in 2013. The Prime Minister gives the report on what has been achieved.

- Government environmental water holders using market behaviour in line with economic productivities of agriculture to maximise joint outcomes.
- Legislated Regional Water Productivity bodies [are formed]
- Local government water services to be provided by expert boards operating on a commercial basis.
- Well developed water markets and trading in all fully developed catchments and aquifers, with trading systems similar to those used on the ASX [Australian Stock Exchange]
- There are easy ways for farmers to trade water outside of irrigation districts and the agricultural industry is accountable for its use.
- The success of environment water trusts and their innovative strategies.
- Creation of an effective 'water grid'.
- Hydropower and other alternative energy sources are being used to help drive irrigation infrastructure.
- Real-time, automated river flow management.
- That the whole community is involved with water use decision, and that farmers could be paid for environmental benefits they provide. (Ayre, 2012)

Respondents in Round 1 of the survey also provided comments on how a working definition of ‘regional water productivity’ could be improved. The themes (ideas) relating to the definition that were raised most were: the need to define the relevant spatial and temporal scale; the need to idtify whether the definition presents ‘water productivity’ as an objective or a measure; the need to identify the context to which the definition applies; and, that the term ‘productivity’ is suggestive of ‘economic productivity’. The definition was re-drafted based on these comments and presented in Round 2 where 63 % of respondents ‘agreed’ with the modified definition.

The stakeholder workshop was designed to review key findings from the survey with a range of water sector experts (n=14; n=8 (non-University of Melbourne participants)). The innovation domains identified as the three ‘most important’ for progressing innovation in RWP were considered in the workshop and further elaborated in terms of key opportunities and constraints for this area.

Table 2: Summary of Discussion Points at the Stakeholder Workshop on Innovation in Regional Water Productivity (19th September 2013)

Innovation Domain	**Key Opportunities**	**Key Constraints**
Governance	To outline the 'ideal' industry reform process including architecture and optimal governance arrangements Developing a governance system that is capable of planning for extremes of climate risks	19th century governance arrangements for water for 21st century governance
Research and Development	The application of existing knowledge not just creating new knowledge Have a portfolio approach that would include short term and long term projects as well as higher risk projects New methods for defining the case for research - that develops partnerships between the problem/need, the practitioners, the community, researchers Prioritise, synthesis and use of current knowledge in new ways If the vision is right then research topics tend to fall out of that Need core detailed studies that can then be extrapolated over larger areas - need to measure the right things in the right way so that bigger change can be supported	Timeframes and incentive structures in R & D work actually works against interdisciplinary work Absence of critical information as well as the existing information is not used well on the benefits of water for the environment Conceptualisation of systems is often too simple or too complex to be useful Lack of critical mass in collaboration across the research effort results in patchy and low impact research work Effects and impacts on social and environmental issues are not systematically described or measured
Infrastructure and Information services	Integration of information and more efficient data collection Improving efficiency in water use on farm and in river Better understanding and acceptance of the benefits and impacts of water use eg the environmental cost of species loss Bureau of Meteorology to hold more integrated data sets in the future	Not sure what to measure for social and ecological benefits of water use Loss of a central research and development organisation (e.g. Land and Water Australia)

Participants contributed further insights into some key innovation ideas in development for the Blueprint for Innovation in RWP and in a formal evaluation of the event either strongly agreed or agreed that the workshop process generated useful insights that will be useful in future RWP research and development (100%; n=8)). They also reported having learnt from others through the

workshop process and either strongly agreed or agreed that they picked up new ideas or information from other participants (100%; n=8).[30]

Did the consultation process for RWP constitute a platform for innovation in research?
Here we elaborate the metaphor of 'platform of innovation' (Ison et al., 2011) as a 'multi-stakeholder coalition' (Roling, 2006) to include sets of heterogeneous—symbolic, material and social— knowledge practices (Ayre & Verran, 2010). Inspired by Shapin and Schaffer's typology of 'technologies of knowledge production' (Shapin & Schaffer, 1985), we understand that innovation in research (as all knowledge production endeavours) will emerge from new, stabilised configurations of research practices or 'platforms'. In the case of the Carlton Connect initiative, the consultation process for RWP emerged as a fledgling 'platform for innovation' in research. Made up of emergent social arrangements, materials and symbols, this platform mobilized new meanings, activities and so-called 'objects' for improving water management in Australia.

For example, a key symbolic or representational practice of the consultation process 'platform for innovation' was the conceptual framework for our collective object of inquiry: 'Innovation in RWP' (see Appendix B). This framework was based in innovation systems theory and designed as a tool to support reflection by researchers and other experts on what is required to improve RWP. The conceptual framework is a *symbolic or representational practice* which formed a basis for communication about the innovation challenge of improving RWP and was used in the online survey, stakeholder workshop and Blueprint document. Key *social practices* of the consultation process were the deliberative forums such as the survey, the RWP and Innovation Stakeholder Workshop, and the Strategic Advisory Committee (for the CC RWP Innovation Hub). Within these forums, a diverse range of expert practitioners and researchers shared their different perspectives and interests on RWP. Following Hounkonnou et al. (2012), we recognise these social practices of the consultation process as a '…platform experiment in dense interaction among national policy makers, senior officials, scientists, NGOs, civil society representatives and donors...as a whole' (p. 80). The deliberative forums established (e.g. online survey) and stabilised networks (e.g. Strategic Advisory Committee) between actors and created new relationships as meanings and ideas were debated, shared, contested and agreed. And finally, *material practices* were also a key component of the consultation process and included: creating meeting spaces; and, financial practices of administering multiple grants (e.g. funds exchanges; contract development etc) to support activity in the RWP Innovation Hub.[31]

The consultation process for developing an innovation agenda for RWP demonstrated new routines ' (Steyaert & Jiggins, 2007) of research practice as described above. These new routines embody a different way of doing research for the University of Melbourne and provide possibilities or conditions for *innovation in research*. A key aspect of these new routine research practices was an attention to design. Considerable effort or 'work' was invested by CC researchers in the consultation process with explicit attention to maintaining openness, and providing opportunity for ongoing reflection, iteration and interaction amongst both researchers and industry and community participants. For example, the focus of the Round 1 survey was to gather a broad range of ideas about RWP through a set of questions aimed to prompt 'brainstorming' and 'visioning'. We then presented these ideas back to survey respondents for further consideration and elaboration in Round 2 of the survey. Together with the discussions and exchanges at the RWP and Innovation Stakeholder Workshop[32], these practices of sharing and producing knowledge about issues of regional water productivity, constituted part of the heterogeneous platform for innovation in research.

[30] A formal evaluation of the workshop was undertaken and responses summarised in a Workshop Outcomes Report of the Regional Productivity and Innovation Workshop, 19th September, 2013.
[31] There were 10 projects funded under the Carlton Connect Regional Water Productivity Innovation Hub focus area in 2013/14.
[32] There were several other stakeholder workshops held as part of the innovation agenda setting process within the Carlton Connection Regional Water Productivity and Innovation Hub in 2013. These 'topic specific' workshops are detailed in Figure 1.

However, it is important to ask: what meanings and actions did these emergent research practices effect? Or in other words, what, dynamics or possibilities did this fledgling platform for innovation unleash? As the draft Blueprint document is still being finalized (and is due for public release soon), it is too early to say what the more unsettling, or conversely galvanising, aspects of the process may be for either the broader water sector or the University of Melbourne itself. It was endorsed by the SAC (in November 2013) and members have a role in facilitating the signing of the final document by the executives of their respective organizations. In this way the University seeks to consolidate the commitment of the peak government water sector agencies represented in a form of 'joint ownership' of the Blueprint.[33] However it remains to be seen what effect this will have on any future funding or new institutional arrangements related to progressing the numerous 'opportunities' for innovation in RWP it identifies.

And, what of the future role or interest of industry and community members who committed their time and expertise to the consultation process? This dispersed community of experts is a critical part of achieving any outcomes from the CC process to setting an innovation agenda for RWP. At the RWP Innovation Stakeholder Workshop, participants provided some reflections on the approach (including the consultation process described here). One participant, for example, suggested that a limitation of the current innovation agenda-setting process was not attending explicitly to a theory of learning:

> …you've [CC/UM researchers] identified what I think is a very valid list of the contemporary issues, but I'm not seeing that there's a commitment to adaptive learning being articulated at the same time. And I think that [adaptive learning] is implicit in the way you're approaching it [RWP innovation] and wishing it to be achieved by partnerships etc…but the difficulty is that researchers can get involved in all of this and it just be one more muddle up…I mean the big difference [in adaptive management approaches] is that there is a commitment to testing hypotheses at the front end of an adaptive management approach; it's not just 'let's have a go and see what works'…(Regional Water Productivity and Innovation Stakeholder Workshop participant, 19 September 2013)

Another participant was concerned about how the draft Blueprint document (discussed in detail at the Stakeholder Workshop) would be used and what implications it had for future action. The issue s/he identified was one of not having clear or transparent governance arrangements to embed the Blueprint:

> I've been thinking about the governance as well…how are you guys [CC/UM researchers] going to make decisions? How do you think you're going to go about translating this into action? (Regional Water Productivity and Innovation Stakeholder Workshop participant, 19 September 2013)

The CC RWP Innovation Hub representatives responded at the workshop by saying that the governance aspects of the Blueprint for Innovation in RWP are yet to be determined. #

Conclusion

Using the case of innovation agenda setting in the RWP Innovation Hub of Carlton Connect at the University of Melbourne, we have shown that a consultation process can perform (de Laet & Mol, 2000) emergent possibilities for innovation in regional water productivity. The consultation process is a fledgling platform for innovation in research which enabled thinking and communication about opportunities, threats and priorities for improving RWP, their articulation and translation in a draft Blueprint for Innovation in RWP, and new social arrangements for enacting innovation (e.g. through the Strategic Advisory Committee for the RWP Innovation Hub). It em-

[33] The draft *Blueprint for Regional Water Productivity* is however jointly authored by University of Melbourne researchers and administrators.

bodied a new set of research practices or 'routines' (Millerand et al., 2013) including: collaborative development of a conceptual design for 'innovation in RWP' (inspired by an innovation systems perspective); interaction and deliberation on innovation in RWP in multi-stakeholder settings (e.g. online survey and stakeholder workshop), and new kinds of material exchanges within the research (institutional) setting (e.g. administrative practices). These routines have the potential to drive institutional change, however this will depend on continued development and formalisation of such new routines of research-development practice within research institutions such as Carlton Connect (at the University of Melbourne) including, for example: social practices (e.g. new partnerships between researchers and other water sector actors); symbolic practices (e.g. new and participatory approaches to understanding and pursuing innovation.

Generating and sustaining new routines of research-development practice will require creativity, reflexivity and continued funding by research institutions to cover the costs of experimentation and interaction (Hounkonnou et al., 2012, 80). Doing research differently is resource intensive and the scope of the consultation work for the innovation agenda setting process was much larger than we had initially conceived. It also requires a commitment by researchers to live with tensions inherent in contested epistemologies and managing different expectations and objects of inquiry. Investing time, energy and intellectual and other resources in participating in the RWP agenda setting process was a challenge for some, particularly for those who were not working as leaders in the various CC RWP Innovation Hub research projects. Therefore, articulating to researchers the benefits of participating in the development of consultation processes (in this case for example, in the co-development of survey questions and stakeholder workshops) is an important role for research institutions and incentives for such participation must be explored and provided. This may include formal recognition and support for leadership roles in innovation agenda setting and participation in interdisciplinary research teams.

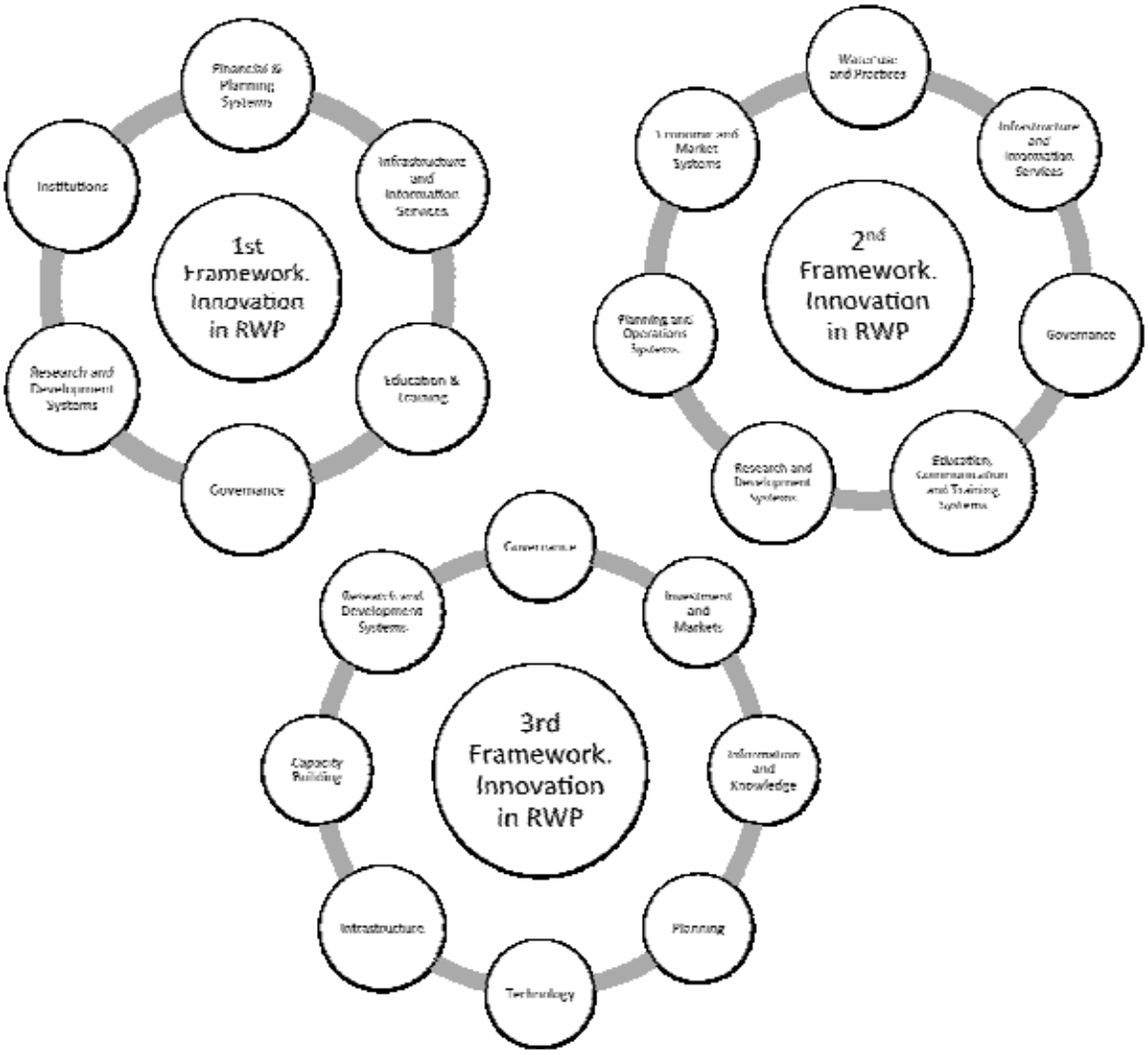
Appendix A

Main opportunities and constraints to achieving transformation in regional water productivity (from Round 1 Survey on Regional Water Productivity and Innovation) (Ayre 2013)

Qualitative statements provided by survey respondents on the three main opportunities for improving regional water productivity currently were analysed and the emerging themes identified as:

- Improvements in irrigation infrastructure and agricultural water use.
- Better ways to understand, measure and communicate about water and its benefits or values.
- Integration of institutions and their decision-making.
- Developing and supporting ways to support decision-making the multiple scales (and 'levels') that constitute 'water use and management'.
- Better stakeholder engagement in decision-making which includes improving information flows and communication between science, policy and professional practice, and regional communities.
- Understanding, recognising and managing the multiple benefits (or outcomes), uses and values of water (e.g. environmental, social, economic, cultural, historical, Indigenous).
- Providing flexibility in water trading and water allocation.
- New ways of using and re-using (or re-cycling) water.
- Changes to farm management and agricultural or catchment management practice to improve water productivity.
- Improving river (flow) management and optimising delivery of water for multiple uses.
- Improving environmental health and services of rivers and catchments.
- Achieving advances in the management of environmental water.
- Better understanding and valuing environmental (river/water) systems through improved methods and investment in research.
- Improved application and development of economic theories and tools to water management, pricing etc.
- Systemic thinking is required for the multiple uses/benefits/values of water and its productive management and use to be realised.
- Qualitative statements provided by survey respondents on the three main constraints to improving regional water productivity currently were analysed and the emerging themes identified as:
- An inability to recognise, measure and monitor the multiple benefits of water.
- The ability to better assess or 'align' these multiple benefits (and not necessarily think in terms of 'trade-offs').
- The need to better understand, use and develop economic concepts and tools to assess, evaluate and communicate multiple benefits of water.
- The need to improve stakeholder engagement through coordination and communication between governments and water users.
- Better understanding of the water requirements of the environment and agricultural and other uses of water.
- A need to further develop public awareness of issues of water productivity (and sustainability) including multiple values in water.

Appendix B: Evolution of the Framework for Innovation in Regional Water Productivity



References

Alexander, K. M., Moglia, M. & Miller, C. (2010). Water needs assessment: Learning to deal with scale, subjectivity and high stakes. Journal of Hydrology 388: 251-257.

Asheim, B. (2011). Regional Innovation Systems: Theory, Empirics and Policy. Regional Studies 45(7): 875-891.

Ayre, M. (2012). Report of Round 1 Survey on Regional Water Productivity and Innovation. Parkville., Regional Water Productivity and Innovation Hub, Carlton Connect, The University of Melbourne.

Ayre, M. & Verran, H. (2010). Learning to be an Aboriginal Ranger: Inductions Into a Strategic Cross-Cultural Knowledge Domain. Learning Communities.

Callon, M. (1986). Some elements of a sociology of translation: domestication of the scallops and the fisherman of St. Brieuc Bay. In Power, Action and Belief: A New Sociology of Knowledge, Sociological Review Monograph 32. J. Law. London, Routledge & Kegan Paul.

de Laet, M. & Mol, A. (2000). The Zimbabwe Bush Pump: mechanics of a fluid technology. Social Studies of Science 30(2): 225-63.

Geels, F. (2004). From sectoral systems of innovation to socio-technical systems: insights about dynamics and change from sociology and institutional theory. Research Policy 33: 897-920.

Hounkonnou, D., Kossou, D., Kuyper, T. W., Leeuwis, C., Nederlof, E. S., Röling, N., Sakyi-Dawson, O., Traoré, M. & van Huis, A. (2012). An innovation systems approach to institutional change: Smallholder development in West Africa. Agricultural Systems 108(0): 74-83.

Ison, R., Collins, K., Colvin, J., Jiggins, J., Roggero, P., Seddaiu, G., Steyaert, P., Toderi, M. & Zanolla, C. (2011). Sustainable Catchment Managing in a Climate Changing World: New Integrative Modalities for Connecting Policy Makers, Scientists and Other Stakeholders. Water Resources Management 25(15): 3977-3992.

Ison, R. L., Bruce, C., Carberry, P. S., Manu, Y., McMillan, L., Pengeall. B.C., Sparrow, A., Stirzaker, R. & Wallis, P. J. (2012). A 'learning systems design' for more effective agricultural research development. International Farming Systems Association 10th Symposium, Aarhus University, Aarhus, Denmark, 1-4 July 2012.

Latour, B. (1987). Science in Action: How to Follow Scientists and Engineers Through Society. Cambridge, Massachusetts, Open University Press.

Law, J. (1999). After ANT: complexity, naming and topology. In Actor-Network Theory and After. J. Law and J. Hassard. Oxford, UK, Blackwell Publishers/The Sociological Review.

Law, J. & Singleton, V. (2000b). Performing technologies stories. draft. Lancaster University, Centre for Science Studies and the Department of Sociology.

Lundvall, B.A. (Ed.), 1992. National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning. London, Pinter.

Mayumi, K. & Giampietro, M. (2006). The epistemological challenge of self-modifying systems: Governance and sustainability in the post-normal science era. Ecological Economics 57: 382–399.

Millerand, F., Ribes, D., Baker, K. S. & Bowker, G. C. (2013). Making an Issue out of a Standard: Storytelling Practices in a Scientific Community. Science, Technology & Human Values 38: 7-43.

Moore, S. A., Wallington, T. J., Hobbs, R. J., Ehrlich, P. R., Holling, C. S., Levin, S., Lindenmayer, D., Pahl-Wostl, C., Possingham, H., Turner, M. G. & Westoby, M. (2009). Diversity in Current Ecological Thinking: Implications for Environmental Management. Environmental Management 43(1): 17-27.

Millerand, F., Ribes, D., Baker, K. S. & Bowker, G. C. (2013). Making an Issue out of a Standard: Storytelling Practices in a Scientific Community. Science, Technology & Human Values 38(1): 7-43.

Mol, A. (2002). The Body Multiple: Ontology in Medical Practice. Durham and London, Duke University Press.

Nettle, R., Brightling, P. & Hope, A. (2013). How programme teams progress agricultural innovation in the Australian dairy industry. The Journal of Agricultural Education and Extension 19(3): 271-290.

Okoli, C. & Pawlowski, S. D. (2004). The Delphi method as a research tool: an example, design considerations and applications. Information & Management 42: 15-29.

Roling, N. (1994). Platforms for decision making about ecosystems. In The future of the land: Mobilising and integrating knowledge for land use options. L. O. Fresco, L. Stroosnijder, J. Bouma and J. van Keulen. Chichester, Wiley: 385-393.

Roling, N. (2006). Conceptual and methodological developments in innovation, Centre for tropical agriculture (CIAT)-Africa.

Shapin, S. & Schaffer, S. (1985). Leviathan and the Air Pump: Hobbes, Boyle and the Experimental Life. Princeton., Princeton University Press.

Stewardson, M., Rajabifard, A., Western, A., Farquharson, B., Karoly, D., Saleem, K., Ayre, M., Nettle, R., Barlow, S., Pettigrove, V., Godden, L., Sharma, R. & Skinner, D. (2014). The Blueprint for Regional Water Productivity Innovation. DRAFT Parkville, Carlton Connect, The University of Melbourne.

Steyaert, P. & Jiggins, J. (2007). Governance of complex environmental situations through social learning: a synthesis of SLIM's lessons for research, policy and practice. Environmental Science & Policy 10(6): 575-586.

Thomson, R., Lewalle, P., Sherman, H., Hibbert, P., Runciman, W. & Castro, G. (2009). Towards an International Classification for Patient Safety: a Delphi survey. International Journal for Quality in Health Care 21: 9-17.

Suchman, L. (2003) "Located Accountabilities in Technology Production." DOI:

Verran, H. (2002). A Postcolonial Moment in Science Studies: Alternative Firing Regimes of Environmental Scientists and Aboriginal Landowners. Social Studies of Science 32: 729-761.

Wieczorek, A. & Hekkert, M. (2012). Systemic instruments for systemic innovation problems: A framework for policy makers and innovation scholars. Science and Public Policy 39: 74-87.