Hitting the bull's-eye: The role of a reflexive monitor in New Zealand agricultural innovation systems

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Abstract
Reflexive monitors (RMs) are vital to the success of co-innovation approaches in Agricultural Innovation System (AIS) projects. While the practices utilised by RMs have been examined in various contexts, links between their roles and the theoretical frameworks they straddle is limited. This paper will address this gap in terms of explaining the case-specific behaviours that have been utilised in seven different New Zealand (NZ) AIS projects. More importantly, however, it will place the role of the RM in a framework that incorporates AIS, Actor Network Theory (ANT), and broader Agricultural Transition Theory (ATT). Qualitative data from interviews with six RMs will be used to argue that RMs are a key component in the co-innovation process and are required to play diverse roles depending on project circumstances to enhance system innovation – for example devil's advocate, project supporter, consensus seeker, conflict mediator, critical enquirer or encourager. The findings have implications for how RMs should be chosen, the characteristics that make a good RM, and how they report on the practice of monitoring a project reflexively.

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5728

1. Introduction

The theoretical framework within which the Reflexive Monitor (RM) role sits in primary industries is the co-innovation approach utilised within the systems innovation and Agricultural Innovation System (AIS) literature. In a seminal resource on applying reflexive monitoring van Mierlo *et al.* (2010b, p. 11) provide the following definition regarding the position of a RM in a project:

> [A RM] encourages participants to keep reflecting on the relationships between the key items: the *ambitions* of the project, usual *practices* and the way they are embedded in the institutions, plus the *developments* in the system that offer opportunities for realising the ambitions of systems innovation.

While this task in itself may seem like a significant effort, Arkesteijn *et al.* (2015) report that there are various forms a RM position can take at certain points in time. These include observer, facilitator, or even criticiser that works to link ambitions, practices and subsequent project developments (Arkesteijn *et al.* 2015). Importantly, in regard to the workload of a RM, it is also a requirement that they do not fulfil many other tasks within the project so they can maintain focus on broader systemic change (van Mierlo *et al.* 2010b). Figure 1 shows a continuum from 'appreciative inquiry' through to 'critical analysis' to highlight the extremes of where a RM can act depending on project circumstances, although it should be noted that RMs can sit anywhere along the continuum and their positions might be altered by changes over the project lifetime. Appreciative enquiry involves encouraging the project team to build momentum. On the other hand critical enquiry involves questioning the project team and the barriers to project outcomes. Both are examples of facilitation techniques (Kristiansen 2014).
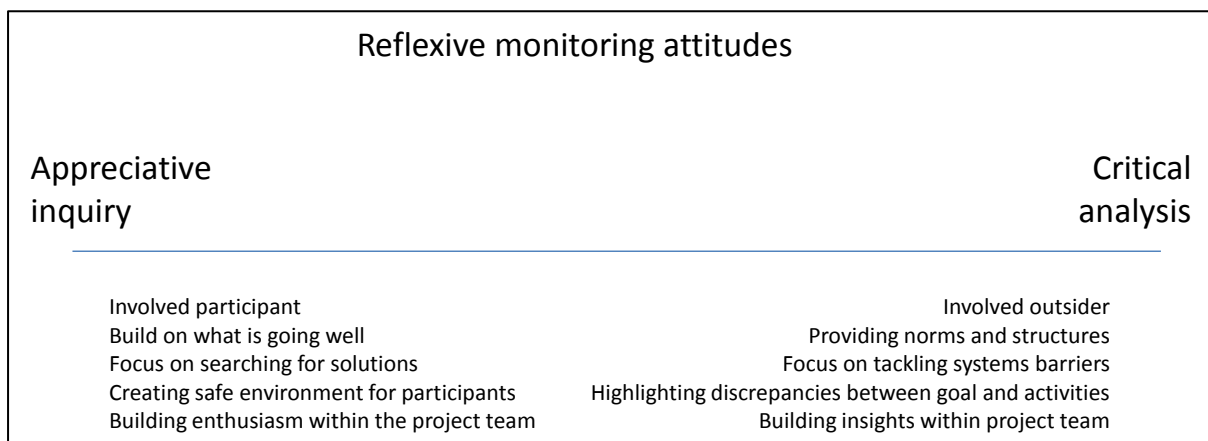
Reflexive monitoring attitudes	
Appreciative inquiry	Critical analysis
Involved participant	Involved outsider
Build on what is going well	Providing norms and structures
Focus on searching for solutions	Focus on tackling systems barriers
Creating safe environment for participants	Highlighting discrepancies between goal and activities
Building enthusiasm within the project team	Building insights within project team

Figure 1: Spectrum of reflexive monitoring attitudes and differences according to approach (Adapted from: van Mierlo et al. (2010b)).

In the context of this paper, AIS is used to frame the institutional interactions of primary industry networks and the impacts of those interactions in addressing a key problem in each innovation project. We aim to build on the AIS literature, as well as to contribute to the broader literature concerning actor-network theory (ANT) (Latour 2005), and agricultural transition theory (ATT) (Wilson 2007). By analysing one actor of an AIS, the RM, we contribute to the application of the co-innovation approach, highlighting the actual roles taken on by RMs in New Zealand (NZ).

This paper examines the RM role in regard to six NZ innovation projects using a participatory action research approach (Chevalier and Buckles 2013). Early within the initial analysis phase of the research programme that included these innovation projects a gap was identified between theory and practical applications of the RM role in NZ, particularly in the experience and tools being used by RMs and complexity in regard to the expectations of the RM role within each project (Rijswijk et al 2015). In this context it was hypothesised that ANT and ATT could be useful frameworks to inform and situate the

practice of reflexive monitoring due to the emphasis on reflection and participation in applied research and practice and the subsequent transitions that manifest. The role of RMs in NZ are analysed through the eyes of RM practitioners and develop two conceptual models; one to expose the factors that influence the RMs ability to function within an innovation programme, and a second to explore how the RM may operate in practice.

This paper thus aims to report on the practical application of RM roles in co-innovation approaches to innovation projects. Firstly, the broad theoretical framework the paper utilises is presented. The research method will then be described before the results are presented to answer the primary research question; what roles are RMs performing in the context of NZ primary sector co-innovation projects? Finally, links back to literature will be made in order to increase the relevance of the findings and encourage debate in broader AIS work.

2. Theoretical framework

Klerkx *et al.* (2012) examine the evolution of AIS in relation to understanding agricultural systems and key enablers for innovation. The concept of co-innovation became a mechanism to link collaboration and innovation in order to solve complex problems (Lee *et al.* 2012). The concept of co-innovation can be thought of as one end of the continuum from direct technology transfer at the other. Co-innovation involves understanding that each actor has a role in designing their future, as opposed to the technology transfer approach (Mylan *et al.* 2015). Reflexive monitoring in action (RMA) is already practiced in the European context (van Mierlo *et al.* 2010b), usually across multiple industries, however, formal RM use within a NZ AIS context is only beginning to emerge (Rijswijk *et al.* 2015).

It is also important to define what is meant by ATT. Here the term is used to broadly encompass the work that has been done in mapping the transitions of agricultural regimes through various processes. For example, Robinson (2004) used the term 'food regimes' to discuss the evolution of agriculture, whilst other important work has encouraged transitions from agricultural bio-economies to eco-economies based on more agro-ecological principles (Marsden 2012; Marsden 2013a; Marsden 2013b). Although it is generally recognised in this work that there is a need for productivist agricultural outputs, for a number of reasons it is increasingly important to value the multiple functions of agricultural land use (Wilson 2007; Wilson 2008). The underlying assumption of these varying, yet related, fields of scholarship is that, as a society, we should aspire to increase the diversity (biological/economic/social or people/profit/planet) of our agricultural systems. It could be argued that within the vast expanse of ATT work, a contribution from ANT may help decipher the trajectory of any future change. This is made possible by Latour (2005, pp. 64-65) asserting that '*for ANT, we now understand the definition of the term is different: it doesn't designate a domain of reality or some particular item, but rather is the name of a movement, a displacement, a transformation, a translation, an enrolment'*. In many cases, broader ATT argues for *change* in the way society conducts agriculture, while ANT can provide an alternate view of this transformation, whereby the resources traditionally dissociated with the social (commodities, scientific research, agricultural policy, or genetic modification to name but a few) become 'actors' in the game, not just '*hapless bearers of symbolic projection'* (Latour 2005, p. 10). These principles are broadly shared with AIS, which points to AIS, ATT, and ANT sharing an ambition for change that could be possible to bring together to increase the strength of such a movement.

3. Method

In regard to this paper, primary data were gathered using semi-structured interviews with the five RMs in each of the six innovation projects in a NZ research programme called Primary Innovation (one interviewee acts as RM for two projects). The innovation projects included: a project examining heifer rearing in the dairy industry; an integrated forestry sector project; a nutrient management project involving the dairy industry; an irrigation scheme project; a project aiming to reduce a pest in tomato and potato crops; and a project looking at broader systemic change within NZ AISs. Interview questions were developed depending on the project the RM was involved in. The questions asked were altered

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to suit the RM being interviewed allowing them to talk more specifically about significant issues relating to the relevant to each innovation project in a more reflexive manner (Beers and Bots 2009; Lamprinopoulou *et al.* 2014).

The following seven steps provide a timeline for the events that have led to the composition of this paper. Of primary importance is the iterative process that has been utilised in order to enhance learning and increase the alignment of the project tasks with the meeting of project aims. Simultaneously, significant effort has gone into the utilisation of more developed theoretical understandings of the RM role in the Dutch context, utilising expertise from the Wageningen University and Research Centre (WUR) and subsequently applying that knowledge to the NZ AIS cases.

1. Research programme begins, with six projects requiring RMs (October 2012): initial confusion, questioning of the RM role.
2. Regular monthly meeting of NZ RMs begins (April 2013).
3. Barbara van Mierlo visit to NZ (August 2013) providing a key question for RM practice: 'what is the ambition for change for the project?'
4. RM trip to WUR (April 2014), including RM workshop with Barbara van Mierlo; highlights diversity in RM role and similar questions from others working in co-innovation space.
5. Projects renamed 'innovation projects' (July 2014) – key shift in thinking for the whole of the research team, reflected in terminology.
6. NZ RM workshop (July 2014) – bull's-eye diagram developed, and 'RM guide' is started.
7. Reflection from RMs via interviews (late 2014/early 2015).

4. Results

4.1. Applying RM principles to decision making

RMs can analyse and reflect on co-innovation projects based on the steps of the action learning cycle (van Mierlo *et al.* 2010b) (Figure 2 inset). Reflection and action should be structured to assist the project team achieve their ambition for change by mitigating systemic failures (van Mierlo *et al.* 2010a; Nederlof *et al.* 2011; Wieczorek and Hekkert 2012). The RM cycle in Figure 2 is also useful for deciding when a RM should intervene in a project to uphold co-innovation principles.
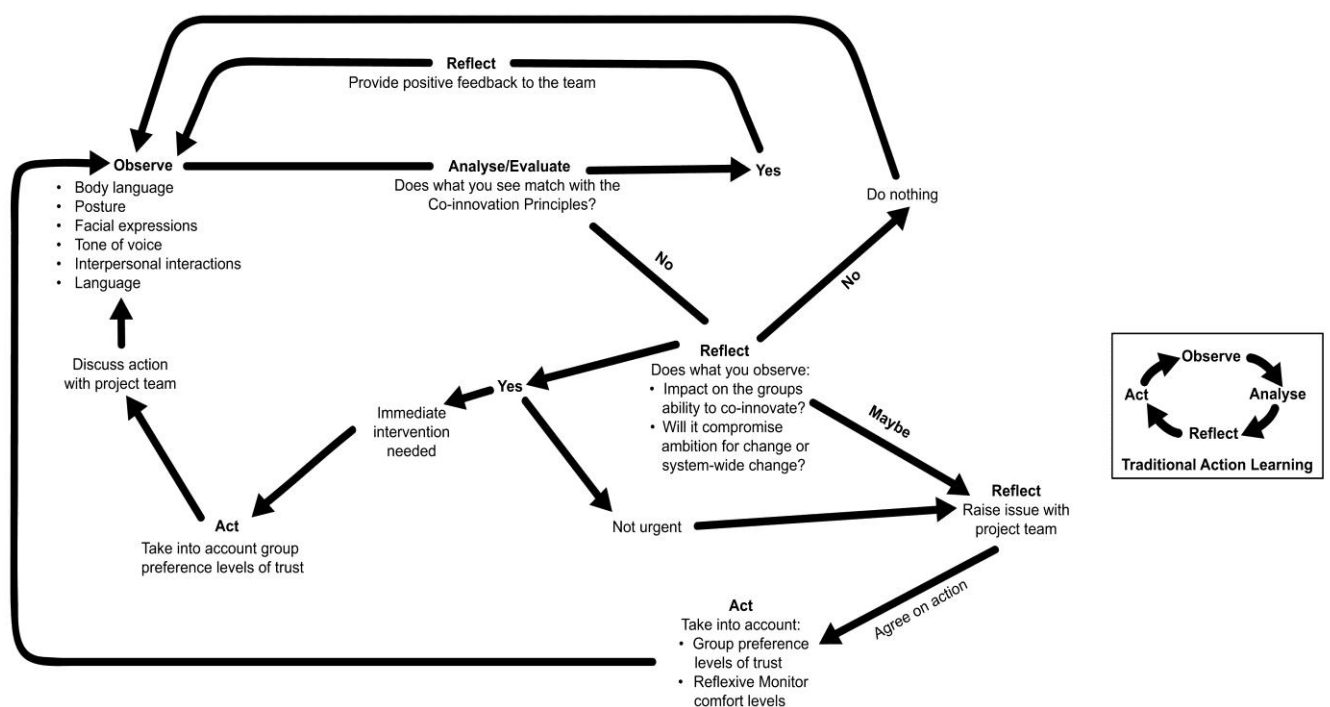

Figure 2: Action learning cycle that could be implemented by a RM.

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At each stage of the RM cycle a process can be followed to determine how a RM might act.

1) **Observe:** The process of observation draws on multiple forms of evidence from body language, facial expressions, tone of voice, interpersonal communication, language used, content of the conversations, short interviews, conversations, structured participant reflections and secondary data sources (Dick 1991; Forester 1999; Kitchin and Tate 2000). van Mierlo (2013, pers. comm.) found that successful RMs were typically experienced facilitators. As a consequence, they are familiar with structuring small group processes of dialogue and decision making.

2) **Analyse and Evaluate**: All the data collected during the previous stage can undergo thematic analysis (Flick 2009). The depth of analysis depends on the speed at which the cycle is moving; the faster the cycle the quicker the thematic analysis. The key questions during analysis are;

- Are these behaviours and actions consistent with the co-innovation principles? (i.e., will it assist the project overcome/change any potential barriers to success within the system?)
- What will the likely impact of the observed behaviours, actions, or practice be on the ambition for change if no intervention occurs?
- What is driving the observed behaviour, practices and action?

   van Mierlo *et al.* (2010b) and Nederlof *et al.* (2011) provide insights into what behaviours and system characteristics are desirable and what may hinder systemic change. This literature and the RMs previous facilitation experience provide a reference point against which to evaluate behaviours and activities within the project.

3) **Reflect:** Once the data has been analysed, reflection can occur on how behaviours, practice or activities could be altered (or current practice strengthened) to enhance the change ambition or generate systemic change. Each option should be carefully evaluated based on the benefits and costs of its application. Who is involved in the refection will depend on the speed at which the cycle is moving; the faster the cycle is moving the less people will be involved. If the cycle is occurring rapidly, the RM may be the sole reflector. Reflection should be structured to assist the project team achieve their ambition for change by mitigating systemic failures (van Mierlo *et al.* 2010a; Nederlof *et al.* 2011; Wieczorek and Hekkert 2012)

4) **Act:** All actions and interventions should be undertaken by the most suitable person and will depend on the nature of the issue. For example, it may be the RM in a meeting setting or the project manager in consultation with other project members. How these actions occur will need to be negotiated with the project team at an early stage of the project. There is a wealth of literature and practice which may inform the choice of action and the benefits and trade-offs associated with each alternative (Dick 1991; Chambers 2002; Chevalier and Buckles 2013).

4.2. What does a RM in NZ do?

This section addresses the primary research question in terms of the roles of RMs in the context of six NZ innovation projects. Based on the experiences of those operating as RMs in the seven cases it was clear that there is no one size fits all definition or approach to reflexive monitoring, as there were examples across the entire spectrum identified by van Mierlo *et al.* (2010b) (Figure 1). All of those interviewed agreed that the role is about supporting the project manager and team to achieve the project goals; *"a supporting role but a critical supporting role"* and is *"a role that doesn't get much recognition".* Other aspects of the role are identified in Table 1. As one RM noted: *"you adapt your skills to the role, and RMs require certain personality traits and mind-sets rather than particular skills… [they must be] open to other viewpoints; [have a] strong team mentality and want to see collaboration and co-learning outcomes".*

Over the life of the research programme there have been shifts in thinking about the RM role. At the beginning of the project there was confusion and questioning as to whether the RM was essential and how it was different to a good facilitator. As the programme began and there was interaction across projects and with other RMs (notably workshops with Barbara van Mierlo from WUR) there was acceptance of the RM role, albeit with some confusion about how exactly it was to be undertaken in specific projects. van Mierlo (pers. comm. 2013) provided an initial question to help guide RMs; 'what is the ambition for change?'

Table 1: Definition of a RM by current RMs.

Tasks	Description
Supporting role (supporting project manager and wider project team)	- *"Support work done by project team"* - *"Find ways to get the group to agree, not everyone will agree but everyone has to be able to live with it"* - *"There to help take temperature gauge, let the project leader know how the process is going"* - *"Picking up different things from what a project manager would pick up"*
Get the project team where it needs to go	*"It doesn't have to be a straight line, it can be a bit wobbly, because it will be, constantly assessing against what you've said you want to achieve, and how are we going towards it"* - *"Always asking why"* - *"Asking the question 'is the project on track?'"* - *"If the direction is changing, do they realise?"* - *"Keeping them on track towards the goal"*
Identifying conflict	-*"Don't get involved in the conflict between members…highlight conflict to project manager"* -*"Mediate conflict…if that's what project manager wants from you"*
Data collector / Evaluator	-*"Making sure the project is tracking along"* - *"Figuring out what is causing blockages"*
Facilitator	- *"Facilitate project meetings"*
Providing feedback	- *"Two different parts, devil's advocate and pushing hard and looking for positives and building support"* - *"Offer opinions throw things back at them to think about"*
Identifying the right stakeholders to be involved and valuing their knowledge	- *"Making sure everyone's knowledge is continually included"* - *"Making sure the right people are involved at the right time"* - *"Having everyone's knowledge heard"* - *"If someone is missing ask why"*

4.3. RM Influence and challenges

During the most recent workshop involving NZ RMs (step 6 of the list in the method section) it was found that not all characteristics identified in Table 1 have the same level of influence to the RM role as others. A diagram was subsequently developed through discussion of the question: 'what influences the way we work and our ability to have impact as reflexive monitors?' Each RM contributed their personal list of items. The workshop was used to identify similar issues and highlight which of these were under the control of the RM. The resulting 'bulls-eye' diagram is presented in Figure 3. In the centre bull's-eye are the aspects that the RM has the most control over, as the circles expand the RM has decreasing influence on these aspects of the role and may find it can be unproductive to attempt to address these concerns (Figure 3). The central controllable aspects of a co-innovation project are of primary importance in regard to choosing individuals to take on a RM position. Follow up interviews (after the most recent workshop) revealed that RMs believed the most important requirements for the role were:

- *personal skills*
- *a good relationship with project manager*
- *having a support network*
- *having a clear job description*
- *having freedom to experiment*
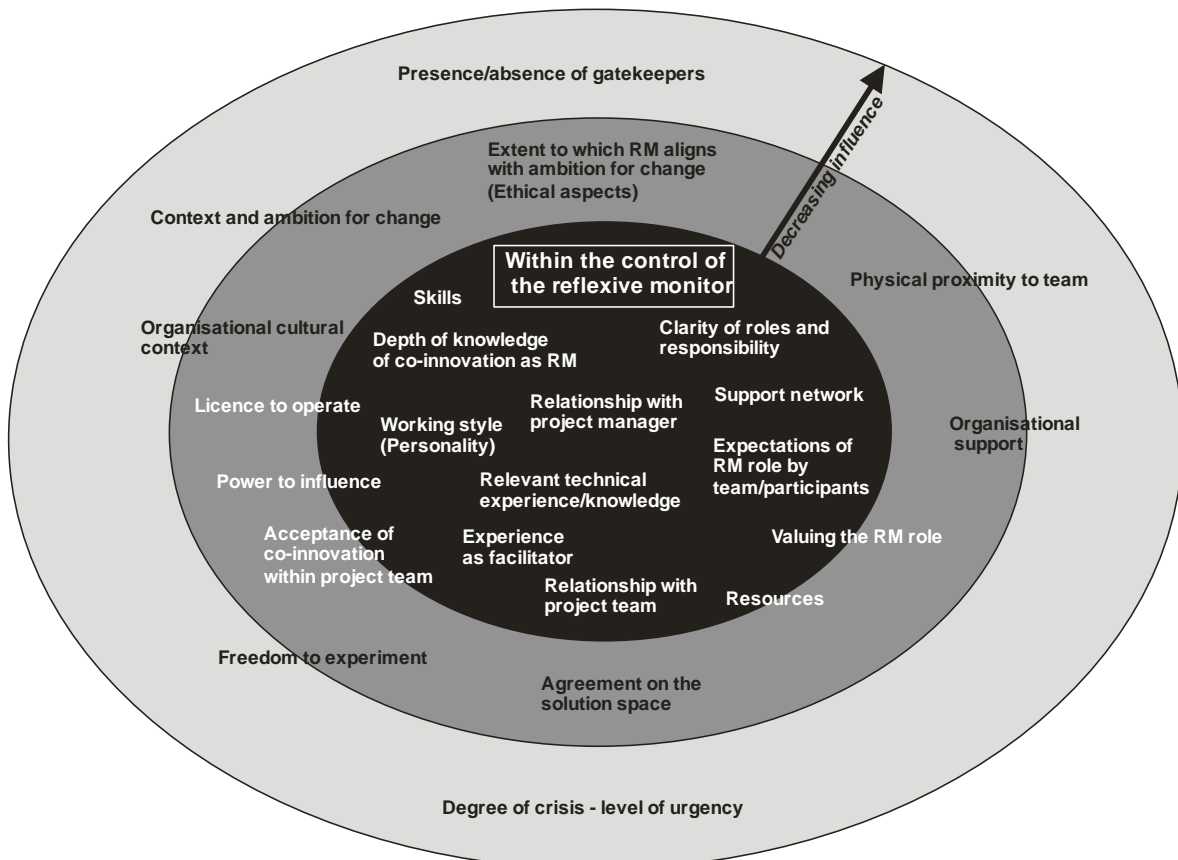- *meeting expectations of the project team*

Figure 3: The bull's-eye highlighting things a RM can control with decreasing influence.

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Similarly, although the RM has less of an influence over the outer rings (Figure 3) these aspects of the project can still present concerns. For example, the challenges a RM will face in the role will be influenced strongly by the:

- Project they are involved with
    - The project might go against the RMs own principles (e.g. personal concerns about Genetically Modified Organisms)
- Project leader and their expectations of the role
    - How the project leader defines the role
    - What the project leader expects of the RM (e.g. interventionist role, sit back and observe or somewhere in between?)
- RMs personality
    - May not be comfortable taking on an interventionist role or being passive/reserved
- RM having another role in the project (e.g. they also provide technical expertise or are conducting social research)
    - This may cause tension between how the RM is seen by the project manager, project team, and how the RM sees the role
- RM working in the same organisation as the project leader
    - May make it harder to be objective or critical
- RM working in a different organisation to the project leader
    - May not be aware of the political climate the project leader is operating in
    - May not understand how the project leader's organisation works
    - May be working with different company structures and hierarchies
- Physical proximity to the project team
    - It may be expensive and time consuming to attend all meetings
    - It may take longer to build up trust
    - There can be a lack of opportunities for informal interaction

Although some of these challenges may be out of the control of the RM, those that cannot be controlled need to be managed in a way which assists the project team and its partners to achieve their ambition for change. It is extremely important as an RM to reflect on all these factors in order to inform practice and identify potential future risks to the project. The primary focus of the RM should be on what they can do to encourage and support the application of co-innovation principles within their projects (van Mierlo *et al.* 2010b). These principles were built from previous work and are based on taking time to understand, being inclusive, valuing various sources of knowledge, being open and honest, sharing a vision, sticking with the process, being flexible and being aware of the wider context (van Mierlo *et al.* 2010b; Nederlof *et al.* 2011).

The literature and results suggest that RMs collect data, provide feedback, support the project and are critical when required. The 13 lessons learnt in Table 2 also make this point quite clear. At all times RMs are required to foster relationships with various actors using components of a broad toolkit which can now be found online (AgResearch Limited 2016). It is also important to consider the role of a RM, and the findings from this work, in relation to a discussion of the theoretical concepts introduced earlier.

Table 2: Lessons learnt from the experiences of RMs.

| Lesson	Examples
Build a relationship with project manager	- *"Need honest conversations around expectations"* - *"Regular communication"* - *"Need their buy-in"* - *"Help facilitate you into the group"* - *"Establish a relationship of trust and rapport with the project leader tough and very direct discussions will come up"* - *"It's a hard road to get the project leader to realise things need to be done differently – there is a fine line between being seen as helpful and being seen to be interfering"*
Define the role	- *"Work with project manager to define the role and what their expectations were"* - *"Important to ask this as there to help them"* - *"Don't go in and say what you think, project manager has to have buy-in"* - *"Need a clear definition of the role at the start"* - *"You must remain disconnected from the project – it is not your project, you need to remain apart from it in order to see it clearly"* - *"Must have the skills to 'speak the truth kindly' and remain dispassionate when those who are personally get defensive when you touch a nerve"*
Use accessible terminology	- *"Jargon doesn't work…is a barrier…use laymen terms"*
Be flexible in your approach	- *"Activities you try"* - *"Be willing to try any approach – think creatively about methodologies"* - *"Takes a lot of time – more than you think"*
Have open communication channels	- *"Always be willing to see another point of view, and encourage others to see other points of view also"* - *"Things won't happen the first time you bring it up – keep telling the same consistent message until they are heard"* - *"Give consistent messages"*
Have a support network	- *"To talk to and off-load"* - *"Don't necessarily need solutions from them"*
Monitor and evaluate	- *"Part of your role"* - *"Helps you understand/track what is going on"*
Provide feedback	- *"Two different parts, devil's advocate and pushing hard and looking for positives and building support"* - *"Can only identify change, you cannot make change happen"* - *"You point out the behaviours needing change and actions that must be taken, but cannot make them change, only support them to change"* - *"If change isn't occurring, or they disagree, then you need to be able to self-evaluate and accept that you might be wrong on this one"*
Specific training is required	- *"Facilitation training"* - *"Conflict resolution"*
Build trust	- *"With the project manager"* - *"With project team members"*
Use different strategies according to participants	- *"Interview team members individually, as this allows them to get across the real institutions and attitudes that are driving the team culture, as well as highlighting what they believe the key problem or ambition for change is"*
No right way to do the role	- *"Best advice I got was from another RM – just make a start, just do something…it is very difficult to know what to do as an RM, so it is literally taking a step out and hoping a stepping stone presents itself so you can go forward"* - *"Context specific – approach role differently based on a number of factors"*
Have a buddy	- *"Someone to learn from"* - *"Talk things through with…doesn't mean giving you answers"*

5. What do the lessons learnt mean for AIS, ANT and broader ATT?

Firstly, it is important to understand that RMs fit within AISs that can be conceptualised in numerous ways. For example, an AIS could form part of a socio-ecological system (SES) approach to a problem, where resources are separated from individual actors and the relationships between these groups form the SES (Lebel *et al.* 2006; Ostrom 2009; Weible *et al.* 2010; Bardsley and Bardsley 2014). Although this might be a useful framework to address some issues – particularly regarding the resilience of systems and their adaptive capacity (Walker and Salt 2006; Olsson *et al.* 2014), in this context it is argued that the AIS literature, and particularly the RM role, sit more readily within conceptualisations of ATT and ANT.

As discussed earlier in the theoretical framework section, AIS projects are based on the recognition that all stakeholders need to be receptive to constant change in the current climate (supporting the ANT thesis of transformation). As found in the results, the RMs role in an AIS project is to be a guiding voice in regard to following the principles of co-innovation by reflecting on where the project is going. Latour (2005, pp. 11-12) calls on social scientists to no longer "*limit the range of acceptable entities, to teach actors what they are, or to add some reflexivity to their blind practice. Using a slogan from ANT, you have 'to follow the actors themselves' that is to try to catch up with their often wild innovations in order to learn from them what the collective existence has become in their hands.*" This highlights an important social science role that RMs must play.

The practical lessons learnt from RMs in the innovation projects in NZ provide evidence of the changing nature of approaches to tackle complex problems by reflectively considering the actions of those involved throughout an innovation project (Table 2). There is 'no right way' to be a RM, you need to be flexible, strategic, work on relationships, and have support in place. Theoretically, the RM role within the framework of RMA could be seen as central to the AIS project, an actor itself in ANT, and contributing to broader ATT by altering the direction of agricultural regimes from inside these networks (Figure 4 shows a simplified diagram of this). There are also broader implications for trans-disciplinary research in general, particularly in regard to linking threads of theories that share similar traits. Although we do not have scope to discuss those in this paper future work will aim to tighten these gaps in knowledge and merge theoretical understanding.

The RM in each project allowed for the actors involved to create space where they could enact their own collective transitions toward project outcomes (Audet 2014). This work highlights the important role of a RM in regard to encouraging innovation and shifting the mind-sets of project stakeholders. As Cohen and Ilieva (2015, p. 201) explain, the '*complexity and uncertainty of a transition make it difficult, if not impossible, to deliberately engineer*'. Conceptually, this work built on important literature to provide both practical suggestions for future RMs and began to thread the 'actors' that are these theories, in the encompassing ANT use of the term, into a larger theoretical meta-database (Latour 2005; Wilson 2007; Klerkx *et al.* 2010; van Mierlo *et al.* 2010b; Marsden 2012).
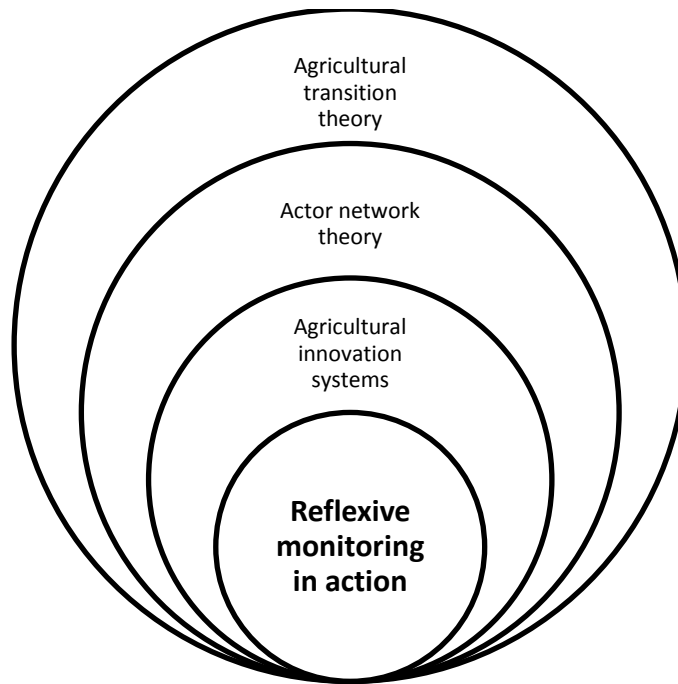
Figure 4: How RMA fits within existing socio-agricultural conceptualisations

6. Conclusion

This paper analysed the role of RMs in regard to six NZ innovation projects. In response to the research question it was found that a RM is required to be prepared for various situations, depending on the individual project, the stakeholders involved and the broader context in which the project sits, as they will influence the actions that can be taken. Simultaneously, a RM should primarily focus on the aspects of a project they can influence (the middle of the bull's-eye in Figure 3) as that will be most productive, hence most likely to alter the agricultural regime they are embedded in. This study strengthened the scholarship around the practical application of reflexive monitoring in AIS and also introduced relations with ATT and ANT. This study found these concepts have potential in regard to taking this work further, particularly as co-innovation through AISs is increasingly recognised as an appropriate approach to tackle problems with ever-increasing complexity.

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8. Acknowledgements