

Reflexive Monitoring in New Zealand

A guide for Reflexive Monitors



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Contents

Section 1	5
Introduction to Reflexive Monitoring	5
1.1 The Context	5
1.2 The What	6
1.3 The environment reflexive monitors operate in	7
1.4 What is Co-innovation?	7
1.5 Outcome of Co-innovation approach	8
1.6 Reflexive monitoring: what is it?	10
1.7 Questions for Reflexive Monitors	11
Question 1: How do reflexive monitors behave within the team?	11
Question 2: How have Reflexive Monitors in New Zealand defined the role	12
Question 3: What have New Zealand Reflexive Monitor actually done?	14
Question 4: What factors influence the reflexive monitors' role?	16
Section 2	23
A guide to the stages that underpin reflexive monitoring	23
2.1 Introduction: So you are a reflexive monitor –What now?	23
Step 1: Relationships building	24
Step 2: Setting the stage for the project/programme and determining the change ambition	26
Step 3: Programme systems analysis and stakeholder analysis	26
Step 4: Acting in an evolving project: Negotiation of solutions	28
Step 5: Implementation Stage	29
Section 3	31
Resources & data collection methods for Reflexive Monitoring	31
Introduction: So you are a reflexive monitor what tools and techniques can you draw on?	31
Analytical methods to support reflexive monitoring	31

<i>3.1 Monitoring and evaluation</i>	<i>31</i>
<i>3.2 Data collection methods to support RM actions</i>	<i>33</i>
1. Action learning Cycle	35
1.1 Qualitative thematic analysis	38
1.2 Rapid thematic analysis for reflexive monitoring purposes	39
1.3 Deciding how to intervene	39
2. Development evaluation	41
3. Feedback sheets	43
4. ORID	44
5. Narratives	46
6. Observations and meeting notes	47
7. Informal conversations and unstructured short interviews	47
8. Structured project team reflections	47
9. Formal Interviews	48
10. Timeline Analysis workshop	50
Conducting a timeline pre-workshop or interview	50
Conducting a timeline during an interview	50
Conducting a timeline during a workshop	51
11. Stakeholder analysis	52
12. Soft Systems (system dynamics) approaches.	54
13. Innovation system function checklist and key questions.	56
Section 4: Key terms, definitions and resources	58
4.1 Terms & Definitions	58
4.2 Further reading and online resources	59
<i>References</i>	<i>61</i>
Appendices	65
Appendix 1: Example of Reflexive monitor and monitor and evaluation data collection plan	65

<i>Reflexive monitoring</i>	69
<i>Data collected</i>	69
<i>Monitor and Evaluation</i>	69
<i>Data collected</i>	69
<i>Semi-regular (every 3 months or at crucial points)</i>	69
Appendix 2: Example of a feedback sheet	72
Appendix 3: Structured team reflection questions	74
<i>Another example of a structured team reflection</i>	80
Appendix 4: Reflexive Monitor Process Checklist to check group functioning against the 9 principles of Co-innovation.	81

Section 1

Introduction to Reflexive Monitoring

1.1 The Context

Primary Innovation a five year programme funded by the Ministry of Business, Innovation and Employment (MBIE) began in October 2012, and was designed to test the use of an Agricultural Innovation System (AIS) approach to enhance the usability, acceptability and therefore adoption of agricultural innovations in New Zealand. The Agricultural Innovation Systems approach draws on co-innovation to address industry focussed problems. Co-innovation processes require relevant stakeholders to collaborate to develop new technologies or practices. It is a learning by doing approach. Co-innovation emphasizes that agricultural innovation is not just about new technologies but it is a co-evolutionary process that may also require institutional change (Botha, Klerkx, Small, & Turner, 2014; Kilelu, Klerkx, & Leeuwis, 2013).

An important element of an Agricultural Innovation System (AIS) approach is the need for participatory, collaborative and co-innovative processes. This is because an AIS response assumes that for complex, multifaceted problems which involve many actors, a more inclusive approach will lead to greater uptake of sustainable innovations and facilitate transformative institutional change (Knickel, Brunori, Rand, & Proost, 2009). Recognised also is the need for reflexive and evaluative processes during, not at the end of a project. More reflexive processes are important because co-innovation processes operate within what can often be a complex and challenging environment where conflicting needs and values of different stakeholder groups must be considered (Rikswijk, Bewsell, Small, & Blackett, 2015). This more reflexive approach also allows ongoing adaptation of a project, an ability to respond to emergent trends, and the opportunity to facilitate learning.

To facilitate this more reflexive approach, establishing a Reflexive Monitor as a key actor to help guide co-innovation projects has had demonstrated success internationally and locally (Beers, Hermans, Veldkamp, & Hinssen, 2014; VanMierlo, Regeer, et al., 2010). (Beers et al., 2014; Rikswijk et al., 2015; VanMierlo, Regeer, et al., 2010). Building on this success the Primary Innovation research programme supported the trial of the use of Reflexive Monitors.

The handbook is not intended to provide a 'one-size-fits-all' approach. Instead, throughout the handbook we have provided practical and relevant guidance, shaped by people who have worked as reflexive monitors in the Primary Innovation programme. It is designed to provide a New Zealand centred companion document to the pioneering work of van Mierlo et al's (2010) Reflexive Monitoring in Action Guide. A variety of tips, tools, techniques, templates, ideas and practical examples are included. The aim of the handbook is that it will add to the repertoire of those working

or wanting to work on a co-innovation project underpinned by reflexive monitoring. While the handbook is useful for those wanting to work within the AIS field, the tips and tools the handbook presents are equally applicable to any field of research wanting to apply a co-innovation approach employing a reflexive monitor.

Five separate innovation projects were undertaken within the Primary Innovation programme, each of which addressed issues of differing complexity. These transdisciplinary projects involved the integration of knowledge from multiple scientific disciplines and local knowledge from industry and community stakeholders. Their aim was to solve industry problems together. In such endeavours, group dynamics, and the relationships between project team members are essential to project success (Burton, Westen, & Kowalski, 2008). Reflection, and co-reflection amongst team members is viewed as an important process for the success of such transdisciplinary projects (Harris & Lyon, 2013; Roux, Stirzaker, Breen, Lefroy, & Creswell, 2010). In order to help enhance the success of the Primary Innovation projects and remove barriers to change each project had a reflexive monitor to help guide the co-innovation process.

The handbook was compiled from reflexive monitoring and co-innovation literature, and Information collected from reflection on projects and processes which have been part of the Primary Innovation programme. Data was gathered from semi-structured interviews with reflexive monitors, and dialogue amongst reflexive monitors about their experiences in this role.

We have presented the topics in a way which encourages readers to think about the challenges and issues that arise in the reflexive monitor role.

1.2 The What

The Handbook is divided into four sections:

Section 1 introduces co-innovation and reflexive monitoring; Section 2 provides a guide to the stages that underpin reflexive monitoring; Section 3 presents the methods, practical tools and steps for data collection and monitoring and evaluation required for reflexive monitoring; and finally Section 4 provides further resources including key terms, definitions, references and links to further literature and websites which are useful for reflexive monitoring.

Importantly the handbook also provides insight into the role and work of reflexive monitors as described by those involved in the New Zealand Primary Innovation research projects. We attempt to present the topics in a way that encourages readers to think about the challenges and issues that arise in the reflexive monitor role.

To contextualise the use of reflexive monitoring the handbook starts by situating the reflexive monitoring role within the co-innovation space.

1.3 The environment reflexive monitors operate in

What informs the parameters of Research and Development (R&D) for scientific problems has shifted markedly over the last few decades. The growing concern with environmental degradation coupled with public concern with the risks of science and technology has led institutions, governments, researchers and communities to seek new ways of operating (Becheikh, Siliha, Castanguay, & Landry, 2010; Beck, 1992; Jasanoff, 1987; Kurian & Wright, 2010).

Whereas once a technocentric/technology transfer approach to scientific problem solving was viewed as sufficient by both government and science institutions (Daly, 1997; Fischer, 2005), there is now a recognition of the interdependence of environmental and social systems. The shift to ensuring a more sustainable approach to the environment acknowledges that there are finite resources and limits to the biophysical environments ability to absorb land use impacts. From this more ecological perspective the maintenance of environmental quality through addressing carrying capacity is necessary (Bell & Morse, 2008; Eckersley, 1998). It acknowledges that an ecologically rational approach should underpin economic and environmental concerns, and inform environmental decision making (Bartlett, 1986; Dryzek, 1997; Hajer, 2009; Murphy & Gouldson, 2000; O'Riordan, 1999). This new understanding (or social construction) (Burr, 1995; Hajer, 2009) which recognises the importance of an ecologically sustainable environment has challenged what is to be studied, how technological innovations are disseminated, and requires the need for more public participation in science and technology governance (Dryzek, 1997; Jasanoff, 2003; Kurian & Wright, 2010; Lafferty, 2004; O'Riordan, 1999; Wright & Kurian, 2010).

The inclusion of the public (stakeholders) in a meaningful and collaborative way, recognizes that decision making which draws on a broad range of knowledge is less likely to be subject to contestation, and will lead to better environmental outcomes. This in turn will increase the chance that products, services and new technologies generated through science will be more readily acceptable (Beck, 1992; Jiwa, 2015; Moffat & Zhang, 2014; Thomson & Boutilier, 2011). Such engagement (at its best) can establish relationships that are enduring and based on trust. They can lead to new networks of individuals and organisations that collaborate to find new ways to innovate, drawing on new sources of knowledge and diverse resources (Dryzek, 1997; Innes & Booher, 2010; Wright & Kurian, 2010).

1.4 What is Co-innovation?

Co-innovation as a process entails enabling those with an interest in solving a problem to work together interactively to define it and then find a solution. This can include people who work on-farm (e.g. farm owners, managers, staff) and off-farm (e.g. processing companies, researchers,

policy and regulatory agencies, farm input suppliers, rural professionals and non-Government agencies). It also can bring to the table participants from the wider system such as entrepreneurs, banks, commercial businesses.

The goal of a co-innovation approach is to ensure that all the parties who are working together to solve a problem recognize alternative views and sources of knowledge (e.g. local communities, industry, science), and that all these views are represented in problem solving.

It introduces new roles, such as '*process coach*', '*innovation brokers*', '*reflexive monitors*' who help parties to get involved, stay involved and provide feedback on whether progress is being made towards solving the problem that the group agreed was important. A co-innovation response requires new behaviours from parties. It challenges business-as-usual practices and offers a new approach to problem solving. This means that other organisations, industry bodies and quite possibly government policies and programmes must also adapt and change. The Primary Innovation programme tested how a co-innovation approach could enhance Agricultural Innovation Systems using a series of five innovation case study projects, each involving a reflexive monitor.

1.5 Outcome of Co-innovation approach

Drawing on a co-innovation approach can lead to the emergence of new or strengthened innovation networks of individuals and organisations that work collaboratively to address shared problems. It provides a framework by which they can continue to work on new problems as they emerge. This approach therefore can generate increased and sustained social capital.

A co-innovation approach can also influence changes in the wider (agricultural innovation) system by influencing policy makers, funders and investors in the science and innovation system. These networks can also create new opportunities for entrepreneurial behaviour to emerge, in science, business or policy settings. Learning how to work in a co-innovation way can also lead to increased rates of technology adoption and adaptation, ultimately delivering more economic, environmental and/or social impact.

Finally a co-innovation approach can help to build increased resilience in terms of preparedness to face new challenges to our economy, environment and/or society. It facilitates the building of new skills, resources, and networks that can be mobilized to address new barriers to innovation as they emerge.

Table (2) below summarises nine principles that guide co-innovation in practice. These principles are drawn from Nederlof, Wongtschowski & vanderLee (2011). They are deliberately described in action oriented language to facilitate their inclusion in the practice of co-innovation as it evolves in a project.

Table (2): Nine principles of co-innovation in practice

Principles for Co-innovation	Aim
1. Take time to understand the problem from many different views	By taking the time to fully understand the nature of the problem, solutions will be more likely to succeed. If you begin by assuming you understand the problem and already have a preconceived solution you may not get the changes you desire.
2. Be inclusive	Is everyone there who can help understand the nature of the problem and its causes, influence the implementation of any potential solutions, (including those who take ideas to the market or create the rules, as well as those who may potentially block solutions). It is easier to develop a solution together than to try and sell an idea after it is formed.
3. Engage with and value all sources of knowledge	Be respectful of other views experiences and ideas, while at the same time challenging ways of thinking in a constructive manner. Seek new insights and take the time to listen to all the different perspectives – everyone brings something to the table.
4. Strive to learn from each other by actively listening and understanding	How we work together and the roles we have may change over time. Active listening is a way of listening and responding to another person that improves mutual understanding. Be open to new ideas by being willing to let your understanding and perspectives evolve.
5. Keep sight of the shared vision	Agree on the nature of the problem, its causes and the desired outcome of the project, and regularly review this outcome and progress toward achieving it.
6. Be honest, open and constructive in your interactions with other participants	Remember we are all in this together and no one group can solve this problem on their own.
7. Be flexible and adaptable	How we work together and the roles we have may change over time
8. Be aware of the wider context of the problem and any actual or potential changes which may occur	We may need to change our solutions and goals as a result of external influences (natural disaster, legislative changes, world markets, unexpected setbacks)
9. Stick with the process despite its frustrations	Be prepared to be uncomfortable and for setbacks to occur – we may have to work through historical tensions, current tensions and although this is not fun it is a necessary part of negotiating shared and workable solutions. Things will take time, but this investment will pay off.

In the next section we start to unpack what reflexive monitoring is, and how it fits within a co-innovation approach.

1.6 Reflexive monitoring: what is it?

The role of a reflexive monitor (RM), in the New Zealand context, is still evolving but is strongly influenced by the thinking of van Mierlo et al. (2010). A reflexive monitor is an observer, facilitator and sparring partner to encourage participants to reflect on the relationships between project activities, the system context and the ambition for change (Arkesteijn, vanMierlo, & Leeuwis, 2015). The Tamarack institute refers to this role as a 'critical friend' in their work on collective impact (Tamarack Institute, 2017)ⁱ.

Reflexive monitors are particularly important in projects where technological (or other) systems innovation or tough issues need to be solved. Such innovations or issues may require changes at many levels of society and in multiple domains. They may call for new practices which may be radically different from business-as-usual and challenge status quo relationships and institutions. The aim then of a reflexive monitoring approach is to support learning processes in projects that are trying to contribute to system innovation which may challenge prevailing values, ways of working, and institutional settings. Such reflexive monitoring encourages participants to keep reflecting on the relationship between for example the ambitions of the project; usual practices and the way these are embedded in institutions. Reflexive monitoring has been developed to encourage participants to learn from system innovation projects enabling them to make better contributions to structural change (VanMierlo, Arkesteijn, & Leeuwis, 2010; VanMierlo & Hoes, 2015; VanMierlo, Regeer, et al., 2010).

The reflexive monitor role is a standalone role within a systems innovation project. This means that reflexive monitor should not have to fulfil too many other tasks within the project. This division of roles is important in order to ensure the reflexive monitor can maintain good distance and provide encouragement for continuing to focus on the system change required (Arkesteijn et al., 2015; VanMierlo, Regeer, et al., 2010). In essence, the role of the RM is to enable the application of a co-innovation approach to achieve a collective ambition for change. How the reflexive monitor role is enacted, the scope, extent, and range of activities undertaken or intervention required will be entirely dependent on the project and the skill set and style of the RM. This description however of the RM role provides little guidance for newcomers. To remedy this, the guide starts by presenting a series of questions to prompt thinking and help inform the myriad of choices involved in enacting the role of RM.

1.7 Questions for Reflexive Monitors

Question 1: How do reflexive monitors behave within the team?

Question 2: How have Reflexive Monitors in New Zealand defined the role

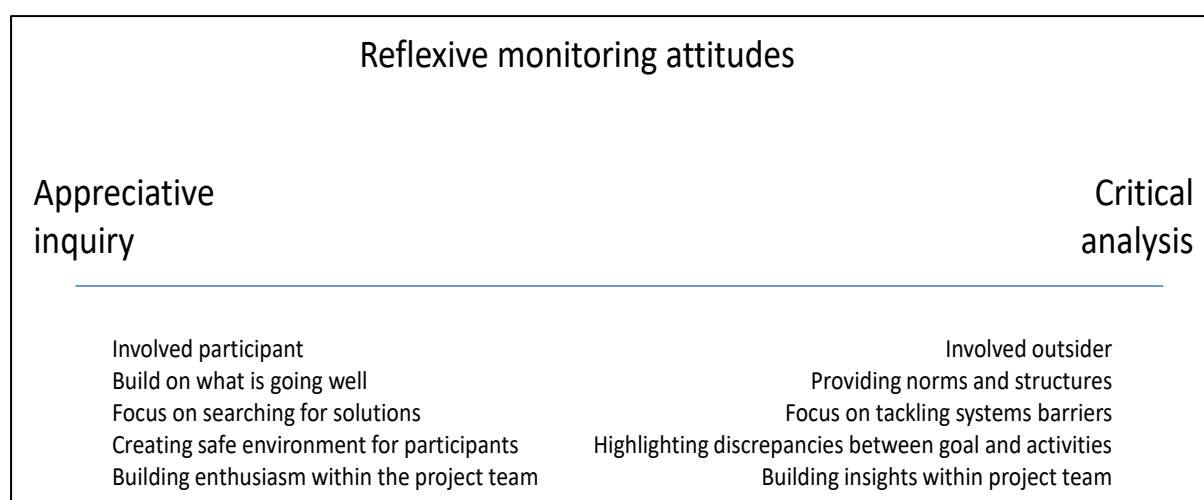
Question 3: What have New Zealand Reflexive Monitor actually done?

Question 4: What factors influence the reflexive monitors' role?

Question 1: How do reflexive monitors behave within the team?

Van Mierlo et al. (2010, p. 21-22) outline two ends of a spectrum that reflexive monitors work across *appreciative inquiry* and *critical analysis*. A reflexive monitor who operates at the '*appreciative inquiry*' end is viewed as an *involved participant* in the project who helps build enthusiasm within the project team. The monitor supports the challenges presented by the project team or participants and helps them tackle these challenges. Reflexive monitors draw on a constructive and exploratory mind-set, the goal is to support the participants desired system changes through incremental steps. The focus is on building engagement to generate momentum for larger change.

In contrast, a reflexive monitor operating at the '*critical analysis*' end of the spectrum is considered an *involved outsider* whose goal is to help build insights within the project team. The reflexive monitor's role is aimed at critically challenging systems barriers, it is centred on providing new norms and structures that can help achieve the group's innovation ambitions. The reflexive monitor as an *involved outsider* provides new norms, structures and ways of working to the project participants based on co-innovation principles. This it must be remembered is a fluid spectrum. Reflexive monitors may find that their place on this spectrum can or will change throughout the life of the project. Figure 1 below summarises this spectrum.

Figure 1: Spectrum of reflexive monitoring attitudes and differences in approach to the role

From (VanMierlo, Regeer, et al., 2010)

We next present some insights and reflection from those who have taken on reflexive monitoring roles in the Primary Innovation projects.

Question 2: How have Reflexive Monitors in New Zealand defined the role

Based on the experiences of those operating as reflexive monitors in the Primary Innovation programme it is clear that *there was no one size fits all* definition or approach to reflexive monitoring. We found examples across the entire spectrum identified by van Mierlo et al (2010). All those interviewed agreed that the role was about supporting the project manager and team to achieve the project goals. Their view was that reflexive monitoring is '*a supporting role but a critical supporting role*' and is '*a role that doesn't get much recognition*'. Other aspects of the role as identified by the participants are presented in Table (3) below.

Table (3). Tasks identified as pivotal to Reflexive Monitor role

Tasks	Descriptive Quotes from Reflexive Monitors
1. Supporting role: assist project manager and wider project team	<p>You need to find ways to get the group to agree, not everyone will agree but everyone has to be able to live with it.</p> <p>The RMs role is to help take a temperature gauge and to let the project leader know how the process is going.</p> <p>The RM picks up on different things from what a project manager can pick up.</p>
2. Get the project team to where it needs to go	<p>It doesn't have to be a straight line and it usually is a bit wobbly.</p>

.	<p>The RMs role is to be constantly assessing what the project is trying to achieve and asking questions about how well we are doing in aiming towards it.</p> <p>You are always asking why? And is the project on track?</p>
3. Identifying conflict and supporting appropriate conflict mediation processes	<p>It is important not to get involved in conflict between members but to highlight this conflict to the project manager. You may mediate such conflict but only if that is what the project manager wants from you.</p>
4. Data collector/evaluator	<p>Data collection and evaluation is an important element of the RMs role. You are making sure the project is tracking along, and if not, figuring out what is causing blockages.</p>
5. Facilitator	<p>The RM must be ready to organise and facilitate project meetings if required. The RM can assist a team to operate in a way that is culturally appropriate, recognising the status of indigenous people and respecting local communities and their knowledge and experiences</p>
6. Providing feedback	<p>Feedback has two different parts. The first part is being the devil's advocate this is where you may have to push hard. The second part is to look for positives and build support.</p> <p>You may be required to offer opinions, to throw things back at the group to think about – to act as a 'mirror'. This requires courage, as well as the explicit and overt support from key support people in the project – such as the project sponsor project manager and others.</p>
7. Identifying the right stakeholders to be involved	<p>If an individual, or a group is missing that you think should be represented you need to be able to ask 'why is this group or individual not here'?</p> <p>You need to make sure the right people are involved at the right time.</p> <p>Another role of the RM is to ensure that everyone's knowledge is continually included and heard.</p>

Experience suggests that the role assumed by the reflexive monitor was dictated by what the project leader and the team need in order to achieve impact and generate change. This “need” will emerge through negotiation and interaction over time, and through a greater understanding of the nature of the problem itself. In short, the role is complex multifaceted and unique to each project hence it will be negotiated and renegotiated over the life of the project. This potential shifting of role means the reflexive monitor needs to be attentive to changing contexts and relationships. We next reflect on what a reflexive monitor's role is, before providing some tips and lessons from the reflexive monitors interviewed for this handbook.

Question 3: What have New Zealand Reflexive Monitor actually done?

WANTED

Caring individuals to support a hazardous but important journey. Must be able to play a variety of roles: coach, strategist, observer, researcher, facilitator, cheerleader, lore keeper, map maker, and critical friend. High tolerance for complexity and uncertainty important. People skills critical. Must be passionate about creating positive social change

Source: Dozois, Langlois, & Blanchet-Cohen, 2010, p. 62

Although a one-size-fits-all approach to reflexive monitoring does not exist, a generic job description has been developed based on the common experiences of current reflexive monitors in New Zealand. These attributes are brought together in Table 4 below. As one reflexive monitor noted:

You adapt your skills to the role, and RMs require certain personality traits and mind-set rather than particular skills... [RMs need to be]... always open to other viewpoints, have a strong team mentality and be invested in wanting collaboration and co-learning outcomes. A RM must also have a highly objective outlook.

Projects and institutions are not in general framed around this much slower more detailed way of working. It does not easily fit in a timeline. It is a flexible process of meeting, tracking, testing, asking uncomfortable questions, developing new iterations and models of working with stakeholders in order to understand and influence complex systems (Dozois, Langlois, & Blanchet-Cohen, 2010; p. 59).

As Table (4) below illustrates it is a complex multifaceted role with multiple tasks requiring a depth of organisational and communication skills. A reflexive monitors role shifts between the 'design' phase, 'act' phase and 'record' phase of a project with monitoring and recording of results being carried out continuously. In the 'design' phase a RM may be involved in the formation of project objectives and mapping these into achievable short and long term goals as well as the selection of participants. In the 'act' phase a watching brief must be kept on what the project is doing, is it achieving what it set out to do, and if not what are the barriers to change. The continuous 'record' phase must note milestones such as interim targets and why has there been success or failure in expected activities. Reflection on these provides the feedback loop for adaptive learning. It can lead to new insights which may lead to adjustment of project activities.

Table (4): Role of Reflexive monitor

Reports to	The project leader
Interacts with	The project team, the project leader and stakeholders
Scope of position	The Reflexive monitor works collaboratively with the project leader, project team members and participants to assist them in delivering the impact desired by everyone involved in the project.
Tasks ❖ Design ❖ Act ❖ Record ❖ Reflect	<ul style="list-style-type: none"> ☑ Support the project manager; help get the project team where it needs to go; make sure the right stakeholders are involved; and Identify conflict within the project team ☑ Observe how the required system change ('ambition for change') is being articulated ☑ Determine whether collaborative actions are designed and implemented (to achieve the system change) and whether learning is taking place ☑ Encourage project participants to reflect upon the relationship between the project and its context, between project activities and between short-terms objectives and long-term goals ☑ Identify, in collaboration with project leader, when intervention is needed to support progress towards the desired impact ☑ Identify, implement and facilitate appropriate interventions in the project to address problems and challenges that have triggered the need for intervention ☑ Monitor, evaluate and record processes, actions and outcomes from innovation project activities ☑ Continually build knowledge and expertise in the application of reflexive methods ☑ Assist the group to articulate and achieve a shared ambition for change, observe how this change ambition is articulated by participants. ☑ Encourage the project to proceed in a manner which is consistent with co-innovation principles (see Section 1 for more information on co-innovation and its principles) ☑ Observe group and individual behaviours and help facilitate change in these where deemed appropriate (i.e., have the potential to affect the ability of the group to achieve system change) ☑ Ensure <i>reflection</i> is built into the process in order to progress the shared ambition and achieve system change ☑ Suggest or undertake interventions when the team appears to be going off track or is stuck ☑ Providing advice to the project team on actions or process to enhance group functioning (supported by the other roles) ☑ Ensuing the trade-offs of project decisions are recognised
Skills	<p>Ability to quickly appreciate and reflect the wording, language and world views of innovation project team and participants</p> <p>Ability to apply both <i>appreciative enquiry</i> and <i>critical analysis</i> methods where appropriate (See Figure 1 above)</p> <p>Experience with multiple methods of observation</p> <p>Knowledge of the monitoring cycle and its application to both projects and the system projects seek to change</p> <p>Knowledge of co-innovation principles</p> <p>Experience working in trans-disciplinary teams</p>

Professional Behaviour	<p>Build and retain trust with the innovation project leader, team and Participants</p> <p>Maintain awareness of how the innovation project team and participants work to ensure the appropriate balance of appreciative inquiry and critical analysis</p> <p>Maintain an appropriate level of distance from project to ensure impartiality</p>
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Question 4: What factors influence the reflexive monitors' role?

Reflexive monitors from the Primary Innovation programme described some key elements that were found to be influential to reflexive monitoring in general and for reflexive monitors in particular. Figure (2) provides an overview of these elements. The elements which are located closer to the centre of the bulls' eye are those which a reflexive monitor has more control over. These include relationship with project manager, support network, and experience as a facilitator. The further outside the bulls eye the less influence a reflexive monitor has. These elements will influence both how the reflexive monitor approaches their role and how effectively they work with the project team.

Not all elements identified in Figure (2) have the same level of influence on the reflexive monitor role as others. Table (5) below summarises the elements which the reflexive monitors expressed as influential to the reflexive monitor role, the degree of control they felt they had to influence these elements, and the importance of each characteristic

Figure 2: Key interlinked elements of reflexive monitoring

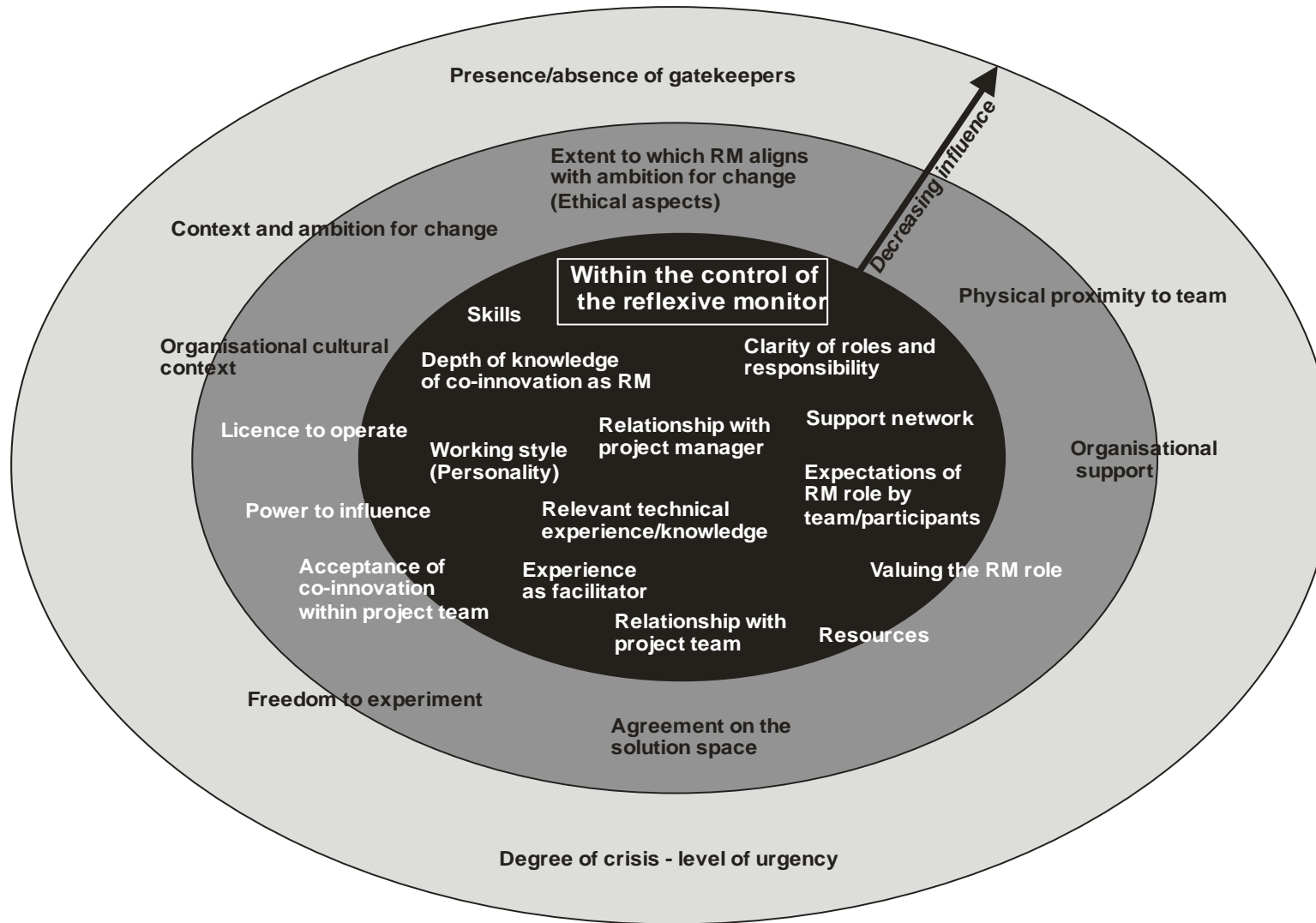


Table (5): Elements which influence a reflexive monitor's role

Characteristics	Definition	Importance to role	Level of influence
1. Your personal skills	An individual's interpersonal skills	Very Important	Can influence
2. Your relationship with project manager	Forming trust; knowing how they like to work; having honest and open communication	Very Important	Can influence
3. Clear job description	Having mutual understanding and agreement what the RM role entails.	Very Important	Can influence
4. Support network	Having people to talk through issues and ideas. They do not always need to provide answers	Very Important	Can influence
5. Expectations of RM role by team	What does the project team want the RM to do? This is a negotiation between the RM and the project team	Very Important	Has some influence
6. Freedom to experiment	Having the space to try and do things differently	Very Important	Has some influence
7. Depth of knowledge of co-innovation	Working knowledge of the principles of co-innovation and how they could work in practice	Important	Can influence
8. Your working style	Degree to which you are comfortable working in a co-innovation way. Degree of comfort with action research	Important	Can influence
9. Your relationship with project team	Having trust and openness with the team. The project team trust your judgement	Important	Can influence
10. Your previous experience as a facilitator	Understanding group dynamics; ability to run meetings and understanding group process.	Important	Can influence
11. Resources	Access to knowledge (records, what's going on in the project) ; methods; ideas; money to do the job	Important	Has some influence
12. Licence to do the job	Act as a RM and fulfil the role	Important	Has some influence
13. Power to influence	Degree to which a RM can influence the direction of the project and influence the project team's behaviour	Important	Has some influence

14. Cultural context	Organisational cultural context that the RM operates in and the project team operates in; behaviours within organisations.	Important	Has little influence
15. Physical proximity to project team	How close is the RM located to the project team?	Important	Has little influence
16. Your relevant technical experience/knowledge	Understanding and grasping the particular topic/issue which the project team is trying to address	Somewhat important	Can influence
17. 17.Value of the RM role by others	If the project team does not believe what the RM is doing has value then the RM cannot make a difference or influence the process	Somewhat important	Has some influence
18. Acceptance of co-innovation within project team	Is the project team willing to give co-innovation principles and practices a fair trial?	Somewhat important	Has some influence
19. Organisational support	Organisation the RM works for provides them with access to resources, moral support and recognition for the role	Somewhat important	Has little influence
20. Presence/absence of Gatekeepers	People, entities and agencies that can limit information pathways, attitudes, and values amongst potential adopters, and also influence thinking and behaviour amongst other influencers and advocacy bodies	Somewhat important	Has little influence
21. Degree of crisis – level of urgency	The context which the project team is operating in; degree of urgency of the issue the project team is working on.	Somewhat important	Has little influence

Based on the views of the New Zealand reflexive monitors the most important elements to be successful were the first six in the Table above: 1.Your personal skills; 2.Your relationship with project manager; 3. having a clear job description; 4. having a support network; 5. expectations of RM role by the project team; 6. freedom to experiment.

The RMs attached to innovation projects have highlighted some problems and challenges that a reflexive monitor can face. These include both individual and institutional constraints. For example, the problems communicated from the participants range from: conflict with personal principles of a reflexive monitor; expectation of the role by reflexive monitors and project managers; problems with being inside or outside an organisation; and proximity and distance to a project. These challenges are summarised in Table 6.

Table (6): Challenges a reflexive monitor may face

Challenge	Problem
Individual challenges	<p>Does the project go against the reflexive monitors principles (e.g. Genetically Modified Organisms)</p> <p>Reflexive monitors personality May or may not be comfortable taking on an interventionist role.</p>
Institutional challenges	<p>Project leader and their expectations of the role How does the project leader define the role? What does the project leader expect of the reflexive monitor (e.g. interventionist role, sit back and observe or somewhere in between?).</p> <p>Reflexive monitor having another role in the project (e.g. they also provide technical expertise or are conducting social research). Having two different roles may cause tension between how the reflexive monitor is seen by the project manager, and project team, and how the reflexive monitor sees the role.</p> <p>Reflexive monitor working in the same organisation as the project leader May make it harder to be objective.</p> <p>Reflexive monitor 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.</p> <p>Physical proximity to the project team Expensive and time consuming to attend all meetings May take longer to build up trust. Lack of opportunities for informal interaction.</p>

We conclude this section by presenting some descriptive quotes from reflexive monitors involved in the Primary Innovation projects about their experience and the lessons they have learnt. What is evident from the descriptive quotes from the monitors is that reflexive monitoring requires good relationships, good communication and the opportunity for productive feedback throughout the project.

Table (7): Experiences of Reflexive Monitors

Lesson	Descriptive Quotes from reflexive monitors
Important to build relationship with project manager	<p>Need honest conversations around expectations</p> <p>Regular communication</p> <p>Need their buy-in</p> <p>Help facilitate you into the group</p> <p>Establish a relationship of trust and rapport with the project leader tough and very direct discussions will come up, and they need to be discussed openly and without judgement</p> <p>It's a hard road to get the project manager and project sponsor to realise things need to be done differently – sometimes I will suggest a change, and this is met in a quite defensive manner – there is a fine line between being seen as helpful and being seen to be interfering</p> <p>Regular phone meetings with the project leader to get an update on where things are at</p>
Defining the role	<p>Work with project manager and project sponsor to define the role and what their expectations are. Important to ask this as they are there to help the RMs</p> <p>Need a clear definition of the role at the start. Say what it is and what it is not. Expect to update and renegotiate this at different project stages</p> <p>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, and be able to support the leader, so cannot get personally invested in the outcome</p> <p>Must have the skills to 'speak the truth kindly' and remain dispassionate when those who are personally get defensive when you touch a nerve</p>
Use accessible terminology	Some language doesn't work and is a barrier... it is important to use laymen terms
Being flexible in your approach	<p>In how you approach the role</p> <p>The activities you try</p> <p>Be willing to try any approach – think creatively about methodologies</p> <p>It can takes a lot of time – more than you think</p>
Having open communication	<p>Always be willing to see another point of view, and encourage others to see other points of view as well</p> <p>Things won't happen the first time you bring it up – keep telling the same consistent message until they are heard</p>
Have a support network	<p>Need someone to talk to and off-load to</p> <p>You don't necessarily need solutions from them</p>

Monitoring and Evaluating	This is an important part of your role Monitoring and evaluation helps you understand/track what is going on
Providing feedback	There are two different parts, you are the devil's advocate and pushing hard as well as looking for positives and building support You 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 to attend	Facilitation training Conflict resolution
Building trust	With the project manager With project team members
Using different strategies for different issues	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 It is context specific – you have to approach the role differently based on a number of factors
Have a buddy	You need someone to learn from and talk things through with... it doesn't mean giving you answers

When beginning a new project the Reflexive Monitor should take time to reflect carefully on the content of this section. By thoroughly considering the context they are operating in particularly the scope, opportunities and potential challenges of the role they will be better informed to assist the team achieve their ambition for change. Each project will present a different suite of challenges and opportunities.

Section 2

A guide to the stages that underpin reflexive monitoring

2.1 Introduction: So you are a reflexive monitor –What now?

At the outset the RM role appears complex, enormous, poorly defined and largely reactive to issues as they emerge. However, there are a number of steps that appear common to the five co-innovation projects that can help structure how the task is approached. More importantly, overlaying a sequence of activities early in the project can pre-empt issues that typically emerge in co-innovation projects. This section provides additional structure and guidance and resources based on five steps emerging from collective experience. These steps are summarised in Table (8) below and further explained in the following sections.

We note here that monitoring and evaluation is also a task that RMs undertake. Differently from other project management approaches monitoring and evaluation occurs regularly within each step. It is an iterative process and one of the key differentiators between reflexive monitoring and other co-innovation approaches. Reflexive monitors must constantly monitor and evaluate across each of the steps throughout the project. Information about monitoring and evaluation methods, tools and techniques for reflexive monitors to draw on for this aspect of their role are presented in Section 3 of the handbook.

Table (8): Steps to structuring a reflexive monitored programme

Steps	Outcome
Step 1 <i>Relationship building</i>	Grappling with who is in the project, why they are there, what they currently understand about the challenge ahead, and what pro conceived notions exists and how you might begin to work together. From this step the RM should gain a clear understanding of the project its members and obtain a mandate to fulfil the RM role through a negotiation with the team.
Step 2 <i>Setting the stage for the project/programme and determining the change ambition</i>	This step embeds a systems based inclusive approach to the problem from the outset. It ensures that enough time is taken to really understand the problem before developing solutions.
Step 3 <i>Programme systems analysis and stakeholder analysis</i>	This step reflects that reflexive monitoring requires stakeholder engagement. By undertaking a programme systems and stakeholder analysis the RM can determine the level of interest and the relation to power (i.e. influence) that the different stakeholders hold. It is important to determine the different understanding of key stakeholders at the early stage of engagement. By doing this appropriate engagement techniques can be found.
Step 4 <i>Acting in an evolving project</i>	Once the team begins the joint process of negotiating a solution or suite of solutions the RM will observe group process and practices and behaviour and potentially intervene if required. Reference to both the nine principles and the ambition for change will provide guidance on when interventions may be needed and what form they could take.
Step 5 <i>Implementation</i>	Once the project team has arrived at an agreed suit of solutions negotiations shift to what should be done, when, and by whom. The reflexive monitor role will likely alter subtly to a greater focus on maintaining motivation and relationships while helping to work-around obstacles and realise opportunities.

Step 1: Relationships building

A critical first step is to build a working relationship with the project manager and other identified team members. Important elements to understand and questions to ask are listed in Table (9). In essence an RM needs to be able to understand what this project is about, who is involved and why, what the project constraints and opportunities could be and have conversations regarding what the expectations of the RM are. These discussion should be revisited throughout the key stages in the project and built into the project plan so that they are recognised and resourced from the outset.

Table (9): Key questions regarding team composition and key relationships

Key questions	Sub-questions	Methods
Who are the project team members?	<ul style="list-style-type: none"> - Who is involved? - What is their back ground and experiences? - What is their motivation? - How do they articulate this project/programme? - What pre-defined solutions exist? - Are these the right people? 	Formal Interviews
What is the problem and the project?	<ul style="list-style-type: none"> - What is the nature of the problem? - How is this work funded? - What are the timeframes apply? - How flexible is the project and programme? - Are there any predefined outputs or expectations? 	Conversations one-on-one meetings Workshops
Establish the expectations of the RM: How will we work together?	<ul style="list-style-type: none"> - What does the project manager understand of the RM role? - What are the expectations on the RM – what pre-conceived notions exist? - Are there preferred ways for the RM to operate? - How, and how frequently, will the group and/or project manager and RM meet? - How will the RM report back on observations and how will interventions be negotiated? - How often will we revisit this relationship and see how it is working? 	Document review Review project documentation; funding
Discuss the scope of the role and what is required	<ul style="list-style-type: none"> - What other roles does the RM need to fill – facilitator or evaluator above and beyond the normal RM requirements - Will the RM be able to intervene as required? - Will the RM attend every meeting or only key ones? - What type of monitoring and evaluations will be helpful? - What other data requirements need to be met? - How often will the group reflect on their progress, learning and impacts? 	

After working through these questions the RM should have a thorough understanding of the project, the current team members and have an agreed mandate for operation.

If an RM cannot successfully establish a working relationship or secure a mandate to operate from the team then it will be exceptionally difficult to be effective. This is more likely to occur if the RM is attached to a technical research project where the project lead perceives little benefit in the association or application of the co-innovation approach. This may not preclude involvement and attempts to change practice but it does make it more complex and difficult. The choices are to persist and seek to affect change through influence on the project leader, allow another RM to try,

or accept that the team is not ready to undertake co-innovation and maintain connections until they are ready.

Relationship building and maintenance is an important thread throughout the project to ensure the continuity of the RM's mandate. At times the relationship will be tested by circumstances, thus the early foundations of honesty and trust are essential.

Step 2: Setting the stage for the project/programme and determining the change ambition

Joint articulation of a shared ambition for change is the likely result of the conversations about the nature of the problem by those who have an interest in or an influence on change. These activities can be used to underpin this ambition. This is an essential stage as it provides the RM with a reference point first to remind the group of where it is going, second to check progress and inform reflection, and finally to support the need for particular interventions. Again the ambition for change needs checking and referencing with the group to insure it is still appropriate and relevant given any changing circumstances.

At this point the team may wish to consider constructing and implementing a monitoring and evaluation plan to formally track progress and an agreed reflexive monitor data collection plan for the RM using an appropriate mix of methods (Appendix 4). Both of these documents may change over the life of the project but are needed to help underpin how the RM will act as the project evolves.

Step 3: Programme systems analysis and stakeholder analysis

A common challenge in co-innovation projects is considering who should be included, how they should be included, and why? It is important to encourage and support an inclusive and systems perspective from the outset. Team members may not be used to approaching their projects/programmes from a systems perspective. Systems perspectives requires taking the time to consider the problem 'before' broaching solutions (Table 10). Embedding this shift in thinking and approach early is helpful. On completion of this stage the project team will have a better system based understanding of the problem. This may lead to a further iteration of considering who should be included in the programme/project. We note here that consideration of membership may need revisiting throughout the life of the project as it evolves and faces new challenges.

Table (10): key questions regarding the system in which the problem is situated

Key questions	Sub-questions	Methods
What is the nature of problem?	- What is the system?	Activities which show the interconnectedness and begin to link cause and effect e.g.
How is the problem represented?	- What are the boundaries of the system?	Soft Systems Methods
Why is it a problem?	- What are the pressures/drivers?	Causal Analysis
How is it a problem?	- What is not working in the system?	
	- What are the consequences of action or inaction?	

Understanding the system can be useful to ensure that the system's environment and structure facilitates co-innovation practices (Hekkert et al. 2007). Tools for understanding systems and system function to facilitate co-innovation practices include soft systems analysis (section 12) and Innovation systems functions (section 13).

Table (11): key questions for systems and stakeholder analysis

Key Questions	Sub-Questions	Methods
Who is it a problem for?	- Who is affected? - How are they affected? - Why are they affected	Methods to understand who is impacted and affected, and its magnitude
Who has a stake or an interest in this problem	- Who is it a problem for? - Whose knowledge is needed to address the problem? - Who needs to be present/engaged/involved? - Why them? - Who has an interest in and influence on change? - Who has an interest in or an influence on maintaining status quo?	Suite of methods known as Stakeholder analysis Formal Interviews Conversations one-on-one meetings Workshops
Who is missing from the discussion?	- Who is missing? - Why are they missing? - Is the absence a problem? Will the absence derail or undermine this project? - How might we engage with those who are missing?	Document review

There are numerous tools available to assist with stakeholder analysis, this is briefly discussed in section 11.

Step 4: Acting in an evolving project: Negotiation of solutions

Once the initial stages of the project are complete, the team will begin the joint process of negotiating through the problem towards a solution or suite of solutions. This phase requires the active attention to group process and practices and behaviour. Experience in the primary innovation programme found three key reference points to help with this (see box below).

Key Reference Points

1. Is the group still working towards their ambition for change or are there road blocks or contestation?
2. Is the group adhering to agreed practices and working within the co-innovation principles?
3. Have we got the right mix of people on the team for what the project needs right now including ensuring the right mix of viewpoints and skill mix ?

What you choose to do and how you decide to approach it will depend on the scale and likely impact of the observed issue and the jointly agreed role of the RM and ability to intervene. Personal preference regarding methods and process will also be a consideration.

You will need to draw on a range of skills and resources depending on the exact nature of the role that has been negotiated with the team. In order to decide when and how to act you will need to think about what data is required to provide evidence for the need to intervene, how to collect data to monitor the situation and how this might prompt and support your decisions and how you might select a course of action. One technique a RM can implement is an action learning cycle (VanMierlo, Regeer, et al., 2010). This approach is described in Section 3.1.

The primary focus of the data collected by the reflexive monitor is to progress the group towards achieving their change ambition. As a consequence, the data gathered by the reflexive monitor, via observation and conversations at meetings, feedback sheets, project meetings, and team reflections is synthesised quickly by the reflexive monitor and used to either direct the project team during meetings or provided to the project team to inform future decisions. In accordance with action learning approaches, the preliminary analysis is used to guide process and conversations.

Step 5: Implementation Stage

The next discernible stage in a project/programme is the implementation phase where participants have negotiated a solution, technology, design, process or suite of these and they begin to work together to enact the negotiated outcome(s).

At this point the critical aspects of co-innovation in practice approach should be relatively embedded in group /team behaviour. The relationships should be robust and the focus on system thinking and inclusiveness should by now be relatively ingrained. Occasional reminders and references to the nine principles and shared ambition for change are still possible, especially if the team /group membership changes. However, such reminders are likely to be less frequent.

Table (12) below provides a guide to useful questions and methods for the implementation stage.

Table (12): Questions for the implementation stage.

Key questions	Sub-questions	Methods
Is the team working together effectively?	Is everyone contributing to implementation? Is the distribution of task functional? Are there disagreement over who should do what?	Formal Interviews Conversations one-on-one Meetings
Is the team still motivated by the ambition for changes?	What are the remaining barriers to implementation? What are the opportunities for implementation? Are there any roadblock and how can these be managed?	Workshops
Are they making the connections to scale up (to other parts of the system) and scale out (to other similar settings) the thinking?	Are all the key stakeholders present for implementation? Is there anyone else that can contribute?	

In several of the Primary Innovation case studies the RM role diminished considerably once the team entered into the implementation phase. This was principally because the first three steps established and defined how co-innovation principles and practices operated within the team and

established reflexive practice as business as usual. In some cases, implementation could occur through normal industry extensions channels and did not need as strong a focus on co-innovation.

If this is the case all of the material on deciding when to act, data collection and analysis and interventions remains relevant but the intervention might be centred on maintaining motivation and managing barriers and opportunities as the project progresses.

Section 3

Resources & data collection methods for Reflexive Monitoring

Introduction: So you are a reflexive monitor what tools and techniques can you draw on?

Currently there is no formal training you can attend to become a reflexive monitor. Instead there are a number of different methods which can help you learn the skills required to operate as a reflexive monitor. Although the background knowledge a reflexive monitor brings to the role is very valuable, they are skills which can be learnt either on-the-job or by attending formal training, such as facilitation courses and 'resolving conflict' training. Other methods for learning include talking to other reflexive monitors and reading relevant literature (see section 4.2 and the reference section).

Analytical methods to support reflexive monitoring

This section provides a summary of different analytical methods for data collection. The methods outlined have proved useful to New Zealand reflexive monitors. Data analysis can be both quantitative and qualitative and follows established social research practice. In essence what is presented are standard social research methods. There may also be other methods and approaches that you are already familiar with which you could also draw on.

We note here that the RM should agree a data collection plan with the project team (Appendix 1) using an appropriate mix of methods such as those listed in (Table (14)). The main goal is that the type and method of data collection needs to meet the objectives and the innovation project monitoring and evaluation plan (Appendix 1).

In addition because reflexive monitoring requires collection of data to track the project as it evolves, the nature of the types of data collection methods has been designed to provide triangulation through multiple lines of evidence to support the analysis. As well as providing evidence to inform RM activities, RM interventions and project team decisions it also generates information for longitudinal data sets to monitor impact over the length of the project. Finally, it allows for the evolution of the project to be recorded as it occurs rather than in retrospect. As stated above the collection of data to track the project is key to co-innovation approaches for institutional change, before we look at specific methods and tools we first provide some information on the thinking behind the type of monitoring and evaluation required for reflexive monitoring.

3.1 Monitoring and evaluation

For projects that incorporate a reflexive monitoring approach to systems innovation monitoring and evaluation need to be embedded in the project from the beginning. The objective or aim of systems

innovation projects are for social, institutional and technological change, therefore they are dynamic and non-linear. Such projects therefore require participants to keep reflecting on the projects ambitions, how it challenges usual practices and how it can inform institutional change.

Monitoring and evaluation for systems innovation projects are not seen as a separate activity but as an integral part of the learning process. The purpose of monitoring and evaluation is to collect and analyse data which captures changes occurring in participants' behaviour, practices and networks. In essence, capturing details on the process and its successes or failures (VanMierlo, Regeer, et al., 2010).

Reflection on insights gained from monitoring and evaluation over the life of the project are key to encouraging the project itself to be reflexive. That is feedback and review of achievements (and failures) can offer new opportunities for re thinking and realising the ambitions of the systems innovation wanted. A project can be seen to be reflexive if those involved develop new ways of acting which shifts the values and practices of participants, and at the same time institutional settings and values are challenged. The 'cyclical processes of planning, doing, observing and reflecting which enables innovation to emerge from interactive learning among stakeholders' (Botha, Coutts, Turner, White, & Williams, 2015, p. 1) occurs because of the monitoring and evaluation processes built into a project.

Monitoring and evaluation therefore is part of a co-innovation projects reflective practice. Patton (2015) comments that 'reflective practice' is the process of debriefing after an activity by capturing people's experiences and views with the aim of improving the process if it is repeated. It is both a formal data collection method, and it becomes an evaluation tool when feedback is given to project managers and/or the different stakeholders who are part of the project. For example by conducting regular debriefing sessions with the project team a reflexive monitor can help identify patterns that are emerging, and work with the project team to solve any issues. We will look further at techniques such as the 'Action learning cycle' and 'Development evaluation' which can help to support effective monitoring and evaluation below.

How monitoring and evaluation is undertaken, and its purpose, is very different from traditional or summative evaluation. More traditional monitoring and evaluation approaches place accountability and control at the centre. Evaluation is something that happens usually at the end. It is the means by which to judge the project or initiatives worth. It is seen as an objective hands off approach. The primary focus of this type of evaluation is on outcomes (Bowen, n.d.; McDonald, 2016).

Differently, the type of monitoring and evaluation which underpins reflexive monitoring sits within what is known as 'utilization focused' evaluation. These approaches have grown out of decision-oriented theories and systems innovation scholarship (Beers et al., 2014; Beers, vanMierlo, & Hoes, 2016; Bowen, n.d.; Janicke & Jorgens, 2009; Patton, 2011). They have been developed

specifically to assist 'adaptive learning in complex and emergent initiatives' (Dozois et al., 2010, p. 10).

A utilization or reflexive evaluative approach is therefore radically different from traditional evaluation. There is an emphasis on meaningful collaboration between key stakeholders and their self-identified needs, it promotes appropriate action on findings across all phases of a project, and the evaluator (reflexive monitor) is embedded as a valued member of the collaborative team (Bowen, n.d., p. 44).

A social learning approach such as reflexive monitoring can help to contribute to transformative structural changes and lead to more sustainable outcomes (Arkesteijn et al., 2015; Beers et al., 2014; Dryzek, 1997; VanMierlo, Arkesteijn, et al., 2010). Table (13) below captures the differences between these two evaluation paradigms.

Table (13): Contrasting monitoring and evaluation approaches

Different approaches to monitoring and evaluation	
Traditional/Summative	Reflexive/Utilization
<ul style="list-style-type: none"> ☑ Detached ☑ Episodic ☑ Goal-judgment ☑ Pre-planned ☑ Road map- problem defined, solution and destination known ☑ Rigid destination ☑ About outcomes 	<ul style="list-style-type: none"> ☑ Embedded ☑ Continuous ☑ Goal-adaptive learning ☑ Emergent ☑ Compass – are we on the right track path is not clear or predictable ☑ Flexible ☑ About constant feedback

3.2 Data collection methods to support RM actions

In this section we present different methods and approaches that reflexive monitors can draw on. The data collection methods next described are summarised in Table (14) below. We start with the 'action learning cycle' which as a method is useful in value setting, relationship building and ongoing monitoring and feedback required for co-innovation projects. This is followed by an outline of development evaluation which is another overarching framework which could be useful. We then look at more specific tools and techniques such as feedback sheets, the use of ORID, narratives and various other structured approaches. These tools can be used within broader methods such as the 'action learning cycle', or as standalone tools.

Table (14): Mix of methods

Data collection method	Description	Further information
1. Action learning cycle	A useful method for value setting, relationship building and ongoing monitoring and feedback required for co-innovation	Section 3.2 (1-1-4)
2. Development evaluation	Designed to support real time learning in emergent situations. It can help in relationship building of a group, help to develop a sense of direction through establishing values and principles that will underpin an innovation project. These values and principles are then used to underpin the development of a co-created learning framework with stakeholders. Such a framework will map challenges, learning opportunities and identify feedback mechanisms.	Section 3.2 (2)
3. ORID	Can provide valuable qualitative information of the strengths and weaknesses of a workshop, or issue, based on the viewpoint of the participants	Section 3.2 (4)
4. Feedback sheets	Short survey to test views at a particular point into e.g., after a workshop or intervention	Section 3.2 (3) Appendix 2
5. Narratives	Short “stories” which demonstrate the link between the activities in a project and the desired outcomes	Section 3.2 (5)
6. Observations and meeting notes	This includes physical observations, quotes, and general notes on the content of discussions	Section 3.2 (6) and Appendix 4
7. Informal conversations and unstructured short interviews	Short informal conversations or unstructured interview questions this would normally occur during conversation in a social setting (i.e., meal or drink breaks) and follow the principles of facilitative questioning	Section 3.2 (7)
8. Structured project team reflections	The purpose is to capture group learning, reflections on process at regular intervals	Section 3.2 (8) and Appendix 3
9. Formal interviews	Formal interviews can range from structured (set questions) to unstructured (no set questions) and be based around questions that need addressing in that project, at that time.	Section 3.2 (9)
10. Timeline analysis workshop	The timeline method provides an opportunity to bringing together project participants to reflect, jointly, on the challenges, successes and lessons from the project. It is a valuable means by which the project team can to identify the causes of tensions, frictions or different understandings among the research project team and stakeholders.	Section 3.2 (10)

11. Stakeholder analysis	It can clarify the different interests and expectations of stakeholders. Reflexive approaches require stakeholder engagement; it is therefore critical that all relevant stakeholders are identified early. It is useful therefore to have in the toolkit some form of systematic approach to defining and identifying stakeholders. While some stakeholders may be obvious, others who are not may get excluded.	Section 3.2 (11)
12. Soft systems and innovation systems approaches	A key strength of a system dynamics approach is that a system model (or map or causal loop diagram) will include all the relevant elements to any given problem irrespective of disciplinary divisions. The process of constructing the system map will generate considerable discussion regarding how the system functions, and how the variables are related.	Section 3.2 (12& 13)

1. Action learning Cycle

A technique a reflexive monitor can implement is an action learning cycle (VanMierlo, Regeer, et al., 2010). Reflection and action in this approach are structured to assist the project team achieve their ambition for change by mitigating systemic failures (Nederlof et al., 2011; VanMierlo, Regeer, et al., 2010; Wesselink, Buchanan, Georgiadou, & Turnhout, 2013). Figure (3) below outlines the action learning cycle. As can be seen it is different from the traditional action learning cycle (see inset in figure below) in that it is not cyclical. Instead the four elements: observe, analyse/evaluate, reflect, and act happen continuously as needed during the reflective process. We will look next at each of the elements of the action learning cycle in turn.

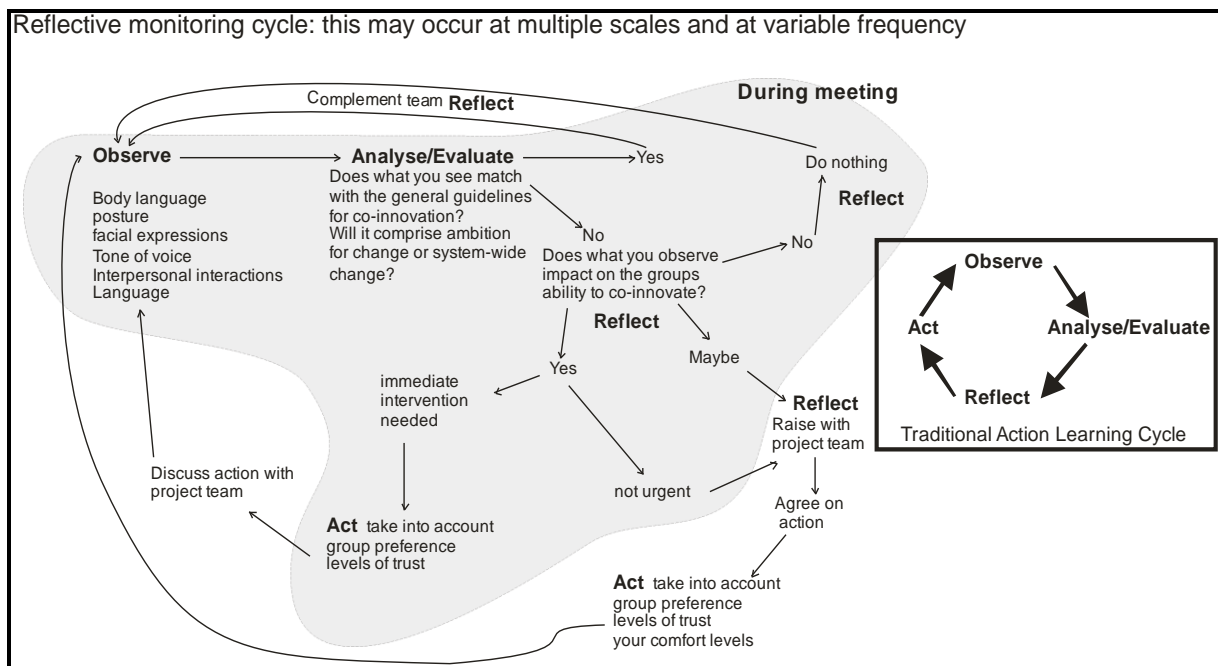


Figure (3): Action Learning Cycle Implemented by the Reflexive Monitor

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; Kitchen & Tate, 2000; Metge & Kinloch, 1978; VanMierlo, Arkesteijn, et al., 2010). A moderate amount of the data collected will be based on the experience of the reflexive monitor. Van Mierlo (2013 pers. comm.) found that successful reflective monitors were typically experienced facilitators. As a consequence, they are familiar with structuring small group processes of dialogue and decision making. Resources on interventions are covered extensively in Van Mierlo (2010; 2010) and the more recent supplement to the Reflexive Monitoring in Action guide 'The learning mirror' (VanMierlo & Hoes, 2015). The learning mirror:

Is a tool that gives participants visual feedback during meetings and assists the participants to align new ideas, with proposed relations and collaborative actions in a logical manner? In this way, action-oriented meetings become more reflective on the connection with contents and relations, whereas meetings with a strong focus on reflection creating new ideas become more action-oriented

(VanMierlo & Hoes, 2015, p.7)

Analyse and Evaluate:

All the data collected during the previous stage undergoes 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

1. 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?)
2. What will the likely impact of the observed behaviours actions or practice be on the ambition for change if no intervention occurs?
3. What is driving the observed behaviour, practices and action?

Reflect

Once the data has been analysed, reflection on how behaviours, practice or activities could be altered (or current practice strengthened) to enhance the change ambition or generate system change occurs. Each option should be carefully evaluated based on the benefits and costs of its application. Who is involved in the reflection 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 reflexive monitor maybe the sole reflector.

Act

All actions and interventions will be undertaken by the most suitable person and will depend on the nature of the issue. For example, it may be the reflexive monitor in a meeting setting or the project manager in consultation with other project members. How these 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 (for example see Chambers, 2002; Chevalier & Buckles, 2011; Dick, 1991; VanMierlo, Regeer, et al., 2010). The impacts of actions will be observed and monitored, effectively beginning the cycle again.

Van Mierlo et al. (2010) and Nederlof et al. (2011) provide insights into what behaviours and system characteristics are desirable and what may hinder system change. This literature and the reflexive monitor's previous facilitation experience provide a reference point against which to evaluate behaviours and activities within the project.

Speed of the action learning cycle

It is important to note that this cycle occurs at multiple levels within the project, at different frequencies and with different participants. This concept is illustrated in Figure (4). For example,

this cycle may occur several times during the course of a single meeting resulting in small and rapid interventions or challenges. This type of intervention may include challenging participants to ensure stakeholder knowledge is strongly represented, or pointing out trade-offs which may have been overlooked. Short cycles are suited to dealing with less complex issues as they arise while longer cycles will deal with more systemic pervasive issues.

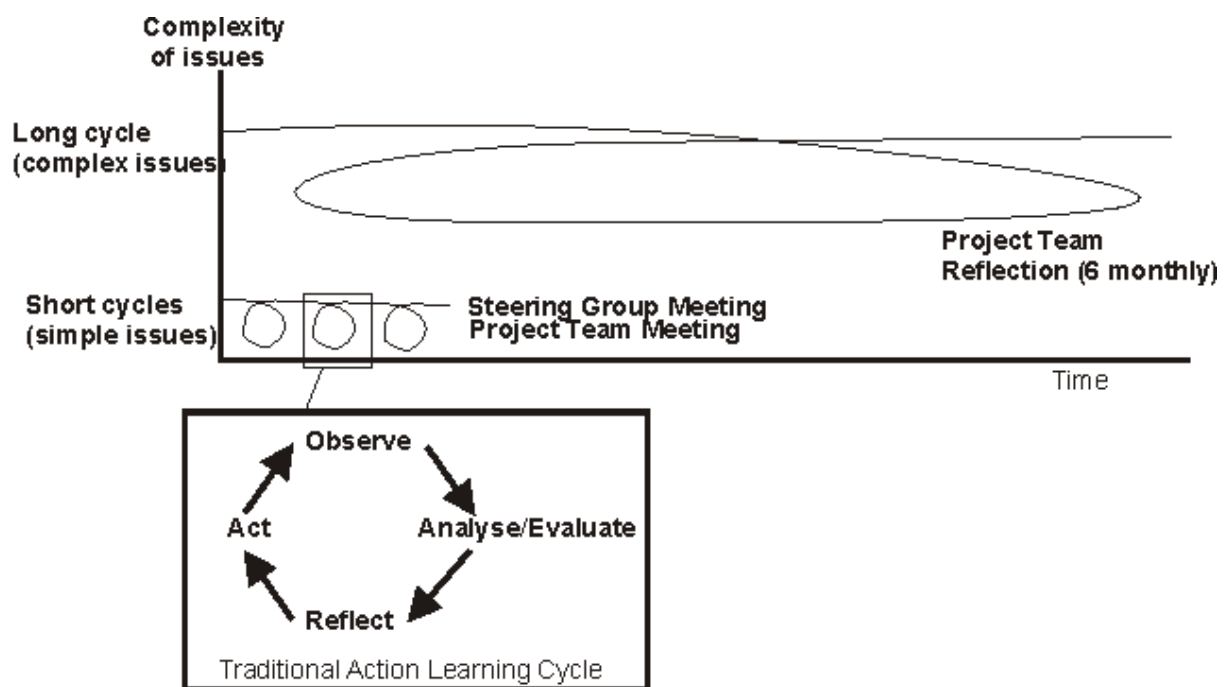


Figure (4): Diagrammatic representation of two different action learning cycles occurring within one innovation

1.1 Qualitative thematic analysis

The principal method of data analysis is qualitative thematic analysis (after Bazeley, 2013; Braun & Clarke, 2008; Flick, 2009; Kitchen & Tate, 2000) which is influenced and shaped by the systems innovation literature (see in particular Nederlof et al., 2011; Wieczorek & Hekkert, 2012). Two types of thematic analysis can occur; rapid and in depth.

The dominant form of analysis is rapid thematic analysis processed by the Reflexive Monitor (see section below). However, the longitudinal data sets are also being captured and could be used in the future. In addition there may be interview data being collected yearly or as required (at crucial

points) to establish more precise context and drivers for different events or behaviours. Longitudinal data sets for more in depth analysis can be used to:

1. Demonstrate impacts
2. Demonstrate changes in thinking
3. Prepare a time line for the project which captures key decisions, and learnings

1.2 Rapid thematic analysis for reflexive monitoring purposes

Rapid thematic analysis has been conducted by the Reflexive Monitor across multiple forms of evidence following (or sometime during) a meeting or event. The rapid thematic analysis follows the principal of all other thematic analysis in that key ideas and themes are identified and supported by the data (see Flick, 2009; VanMierlo, Arkesteijn, et al., 2010). The principal function of this type of analysis is to assist the Reflexive Monitor to perform their functions. The speed of the analysis and the number of people involved in the analysis and reflection will depend entirely on the speed of the action learning cycle. The speed is dictated by the issues in that simple issues of behaviour and practice may be challenged and modified quickly while more systemic and pervasive issues will require a longer timeframe. In some cases where action is deemed urgent the analysis may be extremely rapid and occur within minutes. Where this occurs the action is recorded and discussed with the project team as the earliest possible convenience.

1.3 Deciding how to intervene

The decision on when and how to intervene will be based on observation and data collection and analysis. It may be a rapid intervention during a meeting or event, or require more careful planning when the problem is more systemic. Van Mierlo et al (2010) provide a table to guide the selections of methods for more systemic problems (Box 3). Van Mierlo's 'Leaning Mirror' has subsequently been developed as further support tool for the 'Act' phase of reflexive monitoring (see VanMierlo & Hoes (2015)).

We next turn to development evaluation. The development evaluation approach has many overlaps with the action learning cycle. It could be used by RMs instead of the action learning cycle, or as a support tool within an action learning cycle.

Box 3: Tool section matrix

RMA-TOOL	System analysis	Actor analysis plus causal analysis	Dynamic learning agenda	Indicator sets	Reflexive process description	Audiovisual learning history	Timeline and eye-opener workshop
SITUATIONS IN EACH PHASE							
Design							
> <i>Network composition</i>							
An insufficient picture of who the relevant actors are	X	Xa		X			
Insufficient insight into the interests of the relevant actors		Xa					
A lack of clarity about actors' perspectives on problems and solutions		(Xc)	X				
Too few project participants ready to take a leading role		(Xa)					
Too few innovative perspectives among the project participants		(Xc)					
Insufficient willingness to change (urgency, involvement) among the participants		Xac	X				
Too many opposing positions among the participants	X	Xc	(X)				
> <i>System approach</i>							
Participants focused primarily on the barriers rather than the possible solutions	X	Xc					
Lack of clarity about the causes of the persistent problems	X	Xc	X				
Insufficient ambition in the short-term or long-term goals	X	Xc	X				
Lack of ambition in the planned activities	X	(Xc)	(X)				
Act							
Participants adopt a wait-and-see attitude			X	X			X
Ambitions being diluted, e.g. because of distraction by the everyday details	X	Xc	X	X			
Participants not trusting each other enough		Xc				X	X
Insufficient co-operation between the participants		(Xa)				X	
New insights not converted into actions			X	X			
Participants meet resistance from their own organisations or supporters		(Xa)		(X)		X	X
Transition to the next stage stagnating			(X)	X	X		
Record							
Milestones have not been defined and recorded	X	Xc	(X)	X	X	X	X
Lack of progress or a poor picture of the progress		Xc	X	X	X	X	X
Results not recorded on time or not recorded properly			X			X	X
Anchoring of the results is insufficient or is done too late	X	(Xc)	(X)		X		
Accountability for project results is postponed or becomes fragmented			(X)			(X)	X
Lessons and results are insufficiently applicable in other situations			X	X	X	X	X

2. Development evaluation

Development evaluation as a methodological approach was designed to support real time learning in emergent situations. Such situations are often complex, they may be volatile, difficult to plan or predict and require collaboration among stakeholders (Dozois et al., 2010; Patton, 2011). As a monitoring and evaluative approach development evaluation fits well with a reflexive monitoring approach to problem solving. For example it can help to build a culture of evaluative thinking into a project. It can facilitate reflection on the goals, priorities and decisions being made for the project (Patton, 2015, p. 265).

An important component of a reflexive monitor's role is relationship building. Undertaking a development evaluation can help in relationship building of a group. It can enable a reflexive monitor to develop a sense of direction through establishing from the outset agreed upon values and principles that will underpin an innovation project. These values and principles are then used to underpin the development of a co-created learning framework with stakeholders. Such a framework will map challenges, learning opportunities and identify feedback mechanisms. The framework becomes a living document through which to facilitate actionable goals for the values/direction/innovation a group is trying to be put into action (Dozois et al., 2010). Table (15) summarise how development evaluation approach can support reflexive monitoring and Table (16) provide some key questions to reflect on when undertaking this process

Table (15): Development Evaluation as Reflexive monitoring tool

	Development Evaluation
Can help	<ul style="list-style-type: none"> ☑ <i>Enable a group to build the vision and principles that will underpin a project</i> ☑ <i>Integrate a groups 'theory of change' into a vision which is compelling enough to motivate stakeholders, and clear enough to set direction and action (see https://www.theoryofchange.org/what-is-theory-of-change/)</i> ☑ <i>Ensure that the guiding principles and framework are used as a place to refer back to see if project is on track</i> ☑ <i>Reshape the initial framework as the group learns. For example some of the initial assumptions which shaped the framework will be confirmed or modified or overturned.</i> ☑ <i>Help establish progress markers or indicators so a group can understand whether strategies are successful (or not) and whether there has been changes in behaviours, actions and relationships</i>

There is no set approach to how a development evaluation is carried out, but what this method can do is ‘watch for things to percolate up from interactions, capture those ideas and new relationships and place them in front of project members as options for further development’ (Patton, 2015, p. *ibid*).

As a reflective evaluative method it seeks to contribute to system change by ‘encouraging groups of diverse actors to reflect on the rules and relations underlying current practices. Its goal being to induce institutional change’ (Arkesteijn et al., 2015, p. 108). It can help stakeholders develop and maintain an adaptive orientation within their project; support them to find their way through complexity; help frame and define key elements of the initiative and test their models for accuracy (Dozois et al., 2010).

A useful start to better understand the development evaluation approach is ‘A developmental evaluation primer’ (Gamble, 2008); ‘A Practitioner’s guide to development evaluation’ (Dozois et al., 2010), and for a case study using development evaluation see ‘Development Evaluation Report: A trek through the Youth Scape landscape’_drawing on development evaluation’ (Langlois, 2010).

Here are some key questions to guide a development evaluation.

Table (16): Development Evaluation Questions

<u>Development Evaluation Questions</u>
<ul style="list-style-type: none"> ☑ <i>Are we on the right track?</i> ☑ <i>Are we seeing the change we anticipated?</i> ☑ <i>What improvements or corrections might we consider?</i> ☑ <i>What is emerging?</i> ☑ <i>What does it mean?</i> ☑ <i>What’s next? Why?</i> ☑ <i>What should we be watching for?</i> ☑ <i>What is being learned?</i>

3. Feedback sheets

The feedback sheets used in the primary innovation project were designed based on a generic feedback sheet constructed by an evaluation expert. They were tailored to meet the needs of the RM to:

1. Track how participants perceive the co-innovation principals are being operationalised with respect to group process and functioning as they work towards their ambition for change.
2. To test the impact of a recent intervention. For example, a key finding of the early baseline interviews with the heifer rearing technical advisory group was that participants did not understand what co-innovation meant in practice. This view was supported by the project team. As a result a set of co-innovation guidelines were developed and tested with the wider group to see if they felt this improved their understanding. This was tested both through short open interviews and via the feedback sheets.

Feedback sheets are typically short and contain a mix of closed and short open questions. The results for example from closed quantitative questions on the event and meeting in feedback sheets can be rapidly collated ,sent out to the project team and provide a good mechanism to inform future planning. Appendix 2 provides an example of a feedback sheet

4. ORID

ORID is the acronym for:-

Objective Reflective Interpretive Decisional

The purpose of the ORID process is that it can provide valuable qualitative information of the strengths and weaknesses of a workshop, or issue, based on the viewpoint of the participants. ORID's can be used in any small group situation when you are seeking feedback and group reflection on participants' experiences. The ORID process was designed as a progression of questions that enable a group to reflect on their experiences of an event (Stonfield, 2000).

ORID Process

- Start with a question that is quite focused.
- Divide a sheet of paper into four squares (see Table 14 below)
- Starting with 'Objective' get the group to complete each 'square' in the following order:
 - **Objective** – spend 15% of allocated time focusing on this
 - **Reflective** – spend 15% of allocated time focusing on this
 - **Interpretive** – spend 30% of allocated time focusing on this
 - **Decisional** – spend 30% of allocated time focusing on this
- ❖ The reminding 10% of allocated time should be divided evenly between discussing the question you want to address and reflecting on the outcomes of the exercise.

The strength of the ORID process is in its structure. The structured conversation allows observations to be teased out into what their meaning and implications are for an event or project. This allows participants to collectively make decisions on what works, what doesn't and how things can be changed. However, the structured way of thinking does not come easily and can be awkward for all involved. Having the facilitator explain the process up front and provide a prompt reminding participants about the structure may assist in keeping people on track (Coutts et al., 2016). How to use the ORID process is outlined in Table (17) below.

Table 17: How to use the ORID process

Section	Purpose	Examples of questions to ask
O Objective	Getting the facts	<ul style="list-style-type: none"> - What did we do today? - How did we do it? - What do you remember from today? - What did you hear or see? - How many people were there? - Who was involved, what was said?
R Reflective	Emotions, feelings, associations	<ul style="list-style-type: none"> - How did you feel? - What was your first response? - What other feelings did you experience? - Did you like this or not? - Where do you remember the whole group reacting? - How did your apprehension change or your confidence grow?
I Interpretive	Value, meaning, purpose, learning	<ul style="list-style-type: none"> - What would you say were the main points? - What did this mean? - What were the main messages? - What did you learn? - Which of these actions should be first priority?
D Decisional	Future steps	<ul style="list-style-type: none"> - In what ways can you apply what you saw today? - How might the things you observed today change what you do? - What can you or will you use or follow up from today? - What would you say about this event to someone who was not there?: (Coutts, pers. Comm., 2014)

5. Narratives

Narratives are either self-reported or extracted from the RM notes. The primary function of narratives is to track changes for Monitoring and Evaluation purposes. Narratives are an established data collections mechanism in evaluation (Patton, 2015).

The key function of these structured reflections is to

- Capture group learning
- Reflections on process
- What we have done well and why
- What could have been done differently
- What barriers and opportunities exist

Narratives should be captured cumulatively over the life of the project to capture instances of impact. They are short summary's describing the impact that has occurred as a result of the project. They normally follow a set structure.

Narrative template

Headings which are useful to use when writing down narratives include:

- Date
- Contributed by
- The issues captured in the narrative
- The situation of the participant
- The specific activities/process which triggered a change
- The change that occurred
- The observed/expected impact of that change
- Other comments/observations

The narrative describes the link between the activities in a project and the desired outcomes. These provide an illustration of the impact that has been achieved, or has the potential to be achieved. To maximise value from these narratives they should follow the same format and be systematically collected.

6. Observations and meeting notes

This includes physical observations, quotes, and general notes on the content of discussions. The purpose of this data collection has been to understand and record participants' perceptions of: process; position; attitude; drivers; understanding and influence on the innovation system; organisational culture and willingness to engage with the debate; and, motivation to change practices. Whenever possible information is collected as quotes. This may be supported by documents like Appendix 4.

7. Informal conversations and unstructured short interviews

Short informal conversations or unstructured interview questions can be undertaken to:

1. Clarify a perspective or position noted in a meeting
2. Further identify/explore drivers for a particular action or reason behind comments
3. Obtain feedback on meeting process or intervention.

These questions would normally occur during conversation in a social setting (i.e., meal or drink breaks) and follow the principles of facilitative questioning.

Conversations may not be recorded but will be noted in the Reflexive Monitor's meeting minutes.

8. Structured project team reflections

The aim would be to have structured group reflections roughly every three to six months, although more frequent unstructured reflections may occur during monthly meetings and other project team interactions.

The structured reflections follow the questions listed in Appendix. 3. Each member of the team is asked to individually rank (1-10) the team performance against each question then provide a reason for this ranking. The group then meets to discuss their scores and the reason. The Reflexive Monitor records the conversations. At the end of the dialogue several key actions may be identified. The questions are designed to explore how the group is functioning.

9. Formal Interviews

Formal interviews can range from structured (set questions) to unstructured (no set questions) and be based around questions that need addressing in that project, at that time. There is a wealth of literature available on how to conduct interviews (see Berg & Lune, 2012 for example);

A formal interview presents the opportunity to explore a particular individual's perceptions experience or concerns. Things to consider

1. What are the critical questions?
2. How will the information be treated with respect, confidentiality and anonymity?
3. How will the data be analysed and reported?
4. Who will have access to the information from the interviews?
5. Is an ethics application required?

Interviews will provide a high level of detail but are time consuming to analyses and interpret thus they are not helpful where rapid turn-around of information is necessary.

An example: Ambition for change interviews

Interview questions with the project team occurred once yearly. This gave them the chance to reflect, and also provided a basis for benchmarking progress and what had changed over time:

Year One:

- What is (this project) trying to achieve?
- What's different from what we have always done?
- What does success look like for – i.e. at end of programme, what do you hope to have achieved?
- How will it aid the sector? Why do you think this work is needed (or don't you?)
- How strongly do you agree with this focus?
- Does everyone on the team have this same view of the aim?
- What's your role in achieving this aim?
- Are you up to speed with the programme? What excites you about it?
- What do you see as the most critical piece of work (the project) is currently doing? Why is it critical to success?

Additional Years:

- When I last interviewed you at the start, you said the driver for this work was..... – is this still the case?
- Has your personal view on what is needed changed over life (the project)?
- How have you heard and communicated this vision to other members of the system?

- What has been achieved through (the project)?
- What is the most critical piece of work that was achieved so far? Why was it critical?
- In terms of team dynamics, and the WAY things have been done what particular things have helped you to learn and discover through this research? What has hindered it?
- How do you know what others are up to? How do you know what they are needing?
- What issues have arisen? Have you had sufficient resources to fix the issue?
- Has there been anything stopping or hampering the aim being achieved?
- What's helped speed up achievement? Critical events; persons; skills; equipment etc.

10. Timeline Analysis workshop

Bringing together project participants to reflect, jointly, on the challenges, successes and lessons from the project is valuable for the project team to identify the causes of tensions, frictions or different understandings among the research project team and stakeholders. The timeline method provides an opportunity to do this. Depending on the length of the project and the number of participants it will take between two to four hours to run a timeline workshop.

A timeline analysis involves someone collecting information on project events over the life of the project and constructing a draft timeline as a starting point for discussion. The draft timeline is then shared at a participant workshop, or during interviews. It is important to get involvement from all workshop participants as people will remember different events. The aim is to gain agreement by all participants on the key events during the life of the project. Participants then identify key moments, highs and lows within the project, and moments of friction. Events which appear to be interpreted differently are important to focus on and discuss. Discussing these differences of interpretation will provide insights into the causes of conflicts that may have never been expressed.

The completed timeline can help the project manager to prioritise sources of tension among the project team and stakeholders and make choices about follow-up steps, based on what has been discussed.

Conducting a timeline pre-workshop or interview

Work with a key project person to establish/identify:

- The start point of the project (this is often pre-funding)
- Key activities or events that occurred to date (or for the duration of the project)

Conducting a timeline during an interview

- Have the timeline typed up on a one pager (using A3 paper might be easier than A4) (and/or possibly have a laptop that you can input as you go)
- Explain to the interviewee that a base timeline has been drafted and key events identified.

Ask them to:

1. Check the accuracy of the base timeline
 2. Have they got any key events to add
-
3. Identify where they felt critical points on the timeline occurred:

- key moments of success
- key challenges within the project;
- high and low points in the project;
- Points of friction or tension.
- As the interviewee talks they (or interviewer) adds this information into the timeline.
- Record the discussion either as notes or audio recording the conversation.
- Pose the reflective question to the interviewee “If you were to draft a set of recommendations for another group embarking on a similar project, what you would recommend in terms of key actions to take to ensure success?”
- Record the discussion.
- For each subsequent interview use the updated version.

Conducting a timeline during a workshop

- Write the timeline up on A1 paper hung on the wall (or using a sticky wall) where the complete timeline can be viewed.
- Make the timeline as interactive as possible with pictures that link to the key events identified included on the timeline.
- The facilitator or key participant who drafted the timeline should talk the timeline through to the rest of the group. Ensure that this is just a presentation of events, not an analysis of these events. Do this by telling the story. E.g. “this happened... and then this...and then this...”
- Participants make notes during the story of any key event that was missing
- Once the timeline has been presented, work through the group with each participant suggesting one idea (written on a post-it) and place this up onto the wall/timeline.
- Review the complete story again once this has been done.
- Place participants into pairs to discuss the following four items and have them write their ideas on post-it notes (one idea per post-it).
 - What were the key moments?
 - What were the highs? Why
 - What were the lows? Why?
 - When was their friction? Why?
- Have someone recording notes through this discussion to collect the details described – or back up with audio recording.
- Pose the reflective question to the group- If you were to draft a set of recommendations for another group embarking on a similar project, what would you recommend in terms of key actions to ensure success?

Capture the answers on post-it notes and put these up on the wall. This approach has been adapted from VanMierlo et.al (2010) guide.

11. Stakeholder analysis

Reflexive approaches require stakeholder engagement. In order to have effective stakeholder engagement it is therefore critical that all relevant stakeholders are identified early. While some stakeholders may be obvious, others who are not may get excluded. This means that it is useful to have in the toolkit some form of systematic approach to defining and identifying stakeholders. Mathur et.al (2007) state that it also be important to map out the levels of interest of different stakeholders in relation to the power that they hold at the early stage of engagement because this can help to determine the appropriate engagement techniques and help to understand any potential conflicts. It can also clarify the different interests and expectations of stakeholders (ibid). The Table (17) summarises the implications of an inclusive or exclusive approach to stakeholder engagement.

Table (17): Inclusive or exclusive approaches to stakeholder engagement

Narrow definition of stakeholders	Broad definition of stakeholders
<ul style="list-style-type: none"> ☑ Local, insider knowledge which can for example preclude community and indigenous knowledge ☑ Project may not be supported by public ☑ Conflict with external or peripheral actors can undermine project goals ☑ Less likely to create new enduring wider partnerships ☑ Equity, fairness and disparate power issues can be ignored ☑ May get technical learning but not social learning 	<ul style="list-style-type: none"> ☑ Captures diverse forms of knowledge ☑ Increased support and ownership of a project ☑ Avoid, reduce conflict ☑ Build social capital and facilitate better collaborative partnership ☑ Promotes equity and fairness ☑ Encourages social learning, increased awareness of differences and can help to change attitudes ☑ Enhance inclusive decision making and sense of empowerment

Source: (Mathur et al., 2007, p. 7)

Another common method undertaken for stakeholder analysis is positioning different groups, individuals, actors on a stakeholder matrix (see Table 18 below). Such an analysis can demonstrate at the outset of a project the high or low degree of influence different actors may have within a project. This information can provide insights as to how best to engage different stakeholder groups which in turn will strengthen engagement and project outcomes

Table (18): Power versus Interest Grid

Stakeholder analysis: power versus interest grid		
	Low-power	High Power
High interest stakeholders	<p>High interest, low power</p> <p>Support and enhance their capacity to be involved especially when they may be affected by findings, as in the case of programme participants.</p> <p>Their involvement increases the diversity of the evaluation</p>	<p>High interest, high power</p> <p>High potential as primary intended users. These are often “Key Players” who are in a prime position to affect use, including using it themselves as well as drawing the attention of others</p>
Low interest stakeholders	<p>Low interest, low power</p> <p>Inform them about the evaluation and its findings. Controversy can quickly turn this amorphous crowd of general public stakeholders into a very interested mob.</p>	<p>Low interest, high power</p> <p>Need to cultivate their interest and be alert in case they pose barriers to use through their disinterest.</p>

(Source: Patton 2008: 80)

12. Soft Systems (system dynamics) approaches.

Proponents of system dynamics, and system thinking in general, believe it is a holistic approach which has the potential to bridge the separation between academic disciplines, as well as the gap between science, policy/management organisations and the public (Costanza & Ruth, 1998). Moreover, it is increasingly hailed as a potential means to resolve complex, multi-stakeholder, trans-disciplinary problems. System dynamics was developed at the Sloan School of Management

(Massachusetts Institute of Technology) in the 1950's. As a field of study, system dynamics seeks to understand the structure and behaviour of complex systems and find appropriate mechanisms to tackle particular problems ((Vennix, Akkermans, & Rouwette, 1996).

Systems approaches focus on identifying both the key variables (often called factors) within a system, and more importantly the relationships between these variables (van den Belt, 2004). This facilitates conversations regarding what the feedback loops are, what the flow on impacts could be, and the presence of time lags between an event/change and its effects. A key strength of a system dynamics approach is that a system model (or map or causal loop diagram) will include all the relevant elements to any given problem irrespective of disciplinary divisions (i.e., if the variable is biological monetary or social). This has considerable merit where complex problems overlap traditional disciplinary or institutional boundaries.

The process of constructing the system map will generate considerable discussion regarding how the system functions, and how the variable

are related. Once this process is complete an agreed systems map can be used as the basis for discussion to enable multiple conversation regarding – who is affected and thus who should be

As simple way to create a joint system map/causal loop diagram

- Ask participants to independently identify on post it notes (one idea per note) what factors influence the problem in question. For example – “what factors influence heifer rearing in New Zealand?”
- Collate and group the ideas
- Begin to construct a system by asking how these factors are related to each other. For example how does this factor affect that factor, is it a direct cause and effect relationship, or does it operate through another variable?
- Continue until all the factors are either incorporated in the map or have been discarded as irrelevant.
- The system map can be taken as far as it helpful for the group, in most cases a simple descriptive map may be sufficient, others may want to quantify and develop a model

included in the team, what factors/variables are critical, what relationships are essential, what changes and solutions are possible and how and where these might alter the existing system. For example, as a systems map for heifer rearing emerged it was evident that the relationship between graziers (those who rear young stock off-farm) and dairy farmers was central, yet had been repeatedly overlooked. Recognition of this oversight shifted the focus of the project substantially.

13. Innovation system function checklist and key questions.

As part of understanding the system it can be useful to ensure that the system's environment and structure facilitates co-innovation practices. Hekkert et al. (2007) point to seven key functions of a well-functioning innovation system (Box 1)

Box 1: Seven Functions of a Well-functioning Innovation System

1. **Entrepreneurial activities:** to translate knowledge into business opportunities, and eventually innovations. Market -oriented experiments and new approach models
2. **Knowledge development:** learning activities, demonstrations, laboratory experiments or adoption trials
3. **Knowledge diffusion/knowledge exchange through networks:** The primary function of networks is to facilitate the exchange of knowledge between all the actors involved in it. Meetings; workshops and presenting outcomes; Learning from others.
4. **Guidance of the search:** The Guidance of the Search function refers to activities that shape the needs, requirements and expectations of actors with respect to their (further) support of the emerging technology. Bringing consensus from approach options.
5. **Market formation:** In order to stimulate innovation, it is usually necessary to create artificial (niche) markets.
6. **Resource mobilization:** the allocation of financial, material and human capital.
7. **Creation of legitimacy:** Combatting resistance from actors with vested interests in the incumbent system. Lobbying and project championship; Creating new regulations and policy as required (Hekkert et al 2007)

A range of diagnostic questions have been developed by Hekkert et al (2007) to assess if the system is working (Box 2), and if not where within the system interventions may be required. This can provide some useful insights in some cases.

Box 2: An Overview of system functions, indicators and diagnostic questions for analysing the functioning of the innovation system functions

Functions and indicators	Diagnostic questions
F1 - Entrepreneurial Experimentation and production - Actors present in industry (from structural analysis)	<ul style="list-style-type: none"> - Are these the most relevant actors? - are there sufficient industrial actors in the innovation system? - do the industrial actors innovate sufficiently? - do the industrial actors focus sufficiently on large scale production? - Does the experimentation and production by entrepreneurs form a barrier for the Innovation System to move to the next phase?
F2 - Knowledge Development - Amount of patents and publications (from structural analysis)	<ul style="list-style-type: none"> - Is the amount of knowledge development sufficient for the development of the innovation system? - Is the quality of knowledge development sufficient for the development of the innovation system? - Does the type of knowledge developed fit with the knowledge needs within the innovation system - Does the quality and/or quantity of knowledge development form a barrier for the TIS to move to the next
F3 - Knowledge exchange - Type and amount of networks	<ul style="list-style-type: none"> - Is there enough knowledge exchange between science and industry? - Is there enough knowledge exchange between users and industry? - Is there sufficient knowledge exchange across geographical borders? - Are there problematic parts of the innovation system in terms of knowledge exchange? - Is knowledge exchange forming a barrier for the IS to move to the next phase?
F4 - Guidance of the Search - Regulations, Visions, Expectations of Government and key actors	<ul style="list-style-type: none"> - Is there a clear vision on how the industry and market should develop? - In terms of growth - In terms of technological design - What are the expectations regarding the technological field? - Are there clear policy goals regarding this technological field? - Are these goals regarded as reliable? - Are the visions and expectations of actors involved sufficiently aligned to reduce uncertainties? - Does this (lack of) shared vision block the development of the TIS?
F5 - Market Formation - Projects installed (e.g. wind parks planned, site allocation and constructed)	<ul style="list-style-type: none"> - Is the current and expected future market size sufficient? - Does market size form a barrier for the development of the innovation system?
F6 - Resource Mobilization - Physical resources (infrastructure, material etc) - Human resources (skilled labor) - Financial resources (investments, venture capital, subsidies etc)	<ul style="list-style-type: none"> - Are there sufficient human resources? If not, does that form a barrier? - Are there sufficient financial resources? If not, does that form a barrier? - Are there expected physical resource constraints that may hamper technology diffusion? - Is the physical infrastructure developed well enough to support the diffusion of technology?
F7 - Counteract resistance to change/legitimacy creation - Length of projects from application to installation to production	<ul style="list-style-type: none"> - What is the average length of a project? Is there a lot of resistance towards the new technology, the set up of projects/permit procedure? - If yes, does it form a barrier?

This concludes the different methods and techniques we have gathered together for the handbook. These are not the only approaches a reflexive monitor could use. There may be others that you know of, or have used in the past which can be drawn on in your role as a reflexive monitor. In section 4 we provide some key terms, definitions and some links to other resources useful for undertaking a reflexive monitor role.

Section 4: Key terms, definitions and resources

4.1 Terms & Definitions

There are some terms used in this document that may be unfamiliar in this context, so definitions have been provided for clarity.

Adaptation: Change to user, practice, and/or their context, will be required to accommodate knowledge/outcome successfully.

Adoption: The uptake or embracing of new ideas or habits; to choose for oneself.

Co-Innovation: Significant collaboration between key stakeholders, using a range of knowledge and skill bases to research, develop and implement a fit for purpose knowledge/outcome.

Complex problems: Have many features that may follow a pattern but can interact in many different, possibly unknown ways. The degree of complexity of a system depends on the number of potentially interacting elements, their interdependence and diversity. Two key features of complex systems are unintended consequences (or the emergent properties) and the difficulty participants can have in making sense of a situation.

Developmental evaluation: is a reflective evaluative method by which the culture of evaluative thinking can be brought into a project. It helps to facilitate reflection on the goals, priorities and decisions being made in a project.

Gatekeepers: People, entities and agencies that can limit information pathways, attitudes, and values amongst potential adopters, and also influence thinking and behaviour amongst other influencers and advocacy bodies.

Monitoring and Evaluating: Systematic data collection to check progress and for use in decision making and planning.

Primary Innovation: A five-year MBIE-backed project which is about creating change in the New Zealand agricultural innovation system using a co-innovation approach.

Technology transfer: Traditional processes for delivering science discoveries to end users.

Wicked problems: Involve complicated science to be delivered and complex institutional arrangements to be addressed.

4.2 Further reading and online resources

A. Books

Chambers, R (2002)

Participatory workshops: A source of 21 sets of ideas and activities London Earthscan

Forester, J (2009)

Dealing with Differences: Dramas of Mediating Public Disputes, Oxford University Press

Laws, D and Forester, J (2015)

Conflict, Improvisation, Governance: Street Level Practices for Urban Democracy,
Routledge

Reid, H, Alarn, M, Berger, R, Cannon, T., & Milligan, A (2009)

*Community-based adaptation to climate change (Vol.60): International Institute for
environment and development.*

Van Mierlo, B., Regeer, B., van Amstel, M., Arkesteijn, M., Beekman, V., Bunders, J., de

Cock, T., Elzen, B., Hoes, A.C. & Leeuwis C. (2010).

Reflexive monitoring in action: A guide for monitoring system innovation projects.

Communication and Innovation Studies, WUR: Wageningen/Amsterdam.

Williams and Hummelbrunner. 2009

Systems concepts in Action: a practitioner's toolkit Stanford University press

- Social research methodology texts will also assist with considering the different options and alternatives

B. Internet Resources

Organisation	Online Resource/link
National coalition for Dialogue and Deliberation (NCDD)	http://www.ncdd.org/
Policy Consensus Initiative	http://www.policyconsensus.org/publications/practicalguide/collaborative_spectrum.pdf
Everyday democracy resources	https://www.everyday-democracy.org
Victoria Department of Environment and Primary Industries Engagement resources	In particular - the engagement toolbox http://www.dse.vic.gov.au/effective-engagment/resources/download-effective-engagement
Consensus Building Institute: tools and resources on conflict resolution, negation and consensus building	http://www.cbuilding.org/
Consensus Building Institute: tools and resources on conflict resolution, negation and consensus building	http://www.cbuilding.org/
Engaging Queenslanders: A guide to community engagement methods and techniques	https://www.qld.gov.au/web/community-engagement/guides-factsheets/documents/engaging-queenslanders-methods-and-techniques.pdf

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Appendices

Appendix 1: Example of Reflexive monitor and monitor and evaluation data collection plan

Table (19): Example of a data collection plan for a Reflexive Monitor0

Reflexive Monitor	Data collected	<input checked="" type="checkbox"/>	Monitor and Evaluation	Data collected	<input checked="" type="checkbox"/>
Regular (Monthly)					
<p>Observation of interactions between team members, including within meetings. Reflexive monitor (or a delegated proxy) will attend meetings in order to observe interactions. Information collected will be collated around the co-innovation principles (and the structures and functions). The purpose on these notes is to track changes in behaviours over time (i.e. moving towards/acceptance and practice of a co-innovation approach).</p> <p>Gauge any potential future issues</p>	<p>Data: Observations around participant interactions and behaviours from meetings</p> <p>This has been gathered through note taking in meetings and in some cases recording conversations</p> <p>Analysis: rapid thematic analysis based around structures and functions</p>		<p>Feedback sheets at events: Feedback sheets will be provided for every meeting. These will be structured to test if participants feel the co-innovation principles are being operationalised and what they take away from project events and activities.</p>	<p>Data: Feedback sheets completed analysed and provided to project team</p> <p>Analysis: rapid thematic analysis based around structures and functions</p> <p>Purpose: Inform RM activities, project team actions and contribute to M&E longitudinal data set</p>	

	<p>Purpose: To inform Reflexive Monitor's activities</p> <p>Data: Capture of stakeholder perspectives, priorities, needs and values topic. Capture as quotes and open ended survey questions. Stakeholder feedback on the developed strategy.</p> <p>Analysis: thematic.</p> <p>Purpose: To inform Reflexive Monitor's activities and ensure inclusion of farmer knowledge.</p>				
<p><u>Reflexive monitor feedback.</u> At each meeting the reflexive monitor will observe proceeding through a process based lens, ensuring that co-innovation practices are followed. When the reflexive monitor matter requires immediate intervention the reflexive monitor will do so – otherwise will report on later.</p>	<p>Data: List of direct interventions</p> <p>Documents and e-mail with advice on process or raising issues with project team</p> <p>Analysis: None</p>		<p>Data: Narratives from participants</p> <p>Analysis: None</p> <p>Purpose: M&E longitudinal data set</p>	<p>Data: Narrative captured where appropriate</p> <p>Analysis: None</p> <p>Purpose: M&E longitudinal data set. Project history and key decision points</p>	

	Purpose: inform project team post meeting				
<u>Questioning of participants during events by the reflexive monitor.</u> During breaks the reflexive monitor will often engage participants' in conversation related to the project. These may act as mini interviews and be noted/recorded in some way. This will be used often to obtain further insights into observations made during the meetings, or to obtain further project context. It will be used to inform recommendations to the project team and actions during the meeting.	Data: Notes on individual conversations between Reflexive Monitor's and participants. Responses and questions Analysis: Rapid thematic analysis Purpose: Reflexive Monitor's purposes.		<u>Data collected by the Reflexive Monitor will be used to provided evidence of project impact</u>	Data: Notes collected to indicate uptake success	
<u>Project team monthly debriefs (often when something critical has occurred).</u> This is an opportunity for the reflexive monitor to continue questioning, clarifying or challenging processes. It may also be an opportunity for the project team members to request the reflexive monitor undertake a particular activity (e.g. data gathering etc.).	Data: Notes from monthly team meetings Analysis: timeline (brief) Purpose: Capture of decisions reasons behind decisions and rationale trade-offs				

<p><u>Assist with answering questions generated by the project team and Reflexive Monitor.</u></p> <p>Scan the literature and provide support as needed.</p>	<p>Data: Interactions recorded through ideas register and notes from monthly phone meetings</p> <p>Advice on</p> <ul style="list-style-type: none"> - Branding issues - Trust building - Stakeholder analysis <p>has been provided</p> <p>Analysis: None</p> <p>Purpose: longitudinal record of challenges and potential solutions.</p>				
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Reflexive monitoring	Data collected		Monitor and Evaluation	Data collected	
Semi-regular (every <u>3 months</u> or at crucial points)					
<u>When critical points in the project are reached</u> (although difficult to establish) it is an opportunity to revisit the ambition for change, i.e. for the reflexive monitor to check on the aims and outcomes for the project and check that things are on track.	Data: Baseline Interviews/discussions with key personal in the project Analysis: thematic analysis Purpose: longitudinal data set key participants or key groups of people				
<u>Longitudinal reflections of project team</u> using the questionnaire developed and used by the heifer rearing innovation project team. These reflections should occur at least twice a year but could be more frequent where required.	Data: Two project team reflections – recorded transcribed and partially analysed Lists of issues and on-going challenges Analysis: Rapid thematic analysis		<u>Assist with analysis of longitudinal team evaluation,</u> track trends over time Capture team learning practice and behaviour changes	Data: Notes collected to indicate uptake success	

	<p>Purpose: longitude M&E data, capture project history (timeline and key decisions point), inform future project activity. Inform immediate actions with in the project and monitor the effect of these changes</p>				
<p><u>With the project team and others as appropriate,</u> discuss the data collected from regular meetings, explore perspectives on success and failures, discuss current challenges, and reflect on the process and improvements. This will include an assessment of the project activities and progress against the co-innovation principles.</p>	<p>Data: project team conversations Additional reflections</p> <p>Analysis: None</p> <p>Purpose: longitudinal data set of key decisions, challenges and team reflection.</p>				

Reflexive monitoring	Data Collected	<input checked="" type="checkbox"/>	Monitoring and Evaluation	Data Collected	<input checked="" type="checkbox"/>
Yearly					
Interviews with key personnel			<p>Data: semi-structured interviews</p> <p>Analysis: Thematic analysis</p> <p>Purpose: capture and document learning practice and behaviour changes over time</p>		

Appendix 2: Example of a feedback sheet

Please circle the relevant number.

1. I understand my role in this project

Agree					Disagree
1	2	3	4	5	6

2. I feel that my contribution (i.e. knowledge and ideas) to the conversation is

Valued					Not valued
1	2	3	4	5	6

3. I trust the other to work together collaboratively on improving heifer rearing

Agree					Disagree
1	2	3	4	5	6

4. I feel part of the group

Agree					Disagree
1	2	3	4	5	6

5. I am comfortable with a joint approach (i.e. with other stakeholders) to improving the issue

Agree					Disagree
1	2	3	4	5	6

6. I think everyone is at the table who needs to be here (i.e. that no key stakeholders are missing)

Agree					Disagree
1	2	3	4	5	6

Who is missing?

7. With regards to our ability as a group to make a positive difference to heifer rearing in NZ I feel very

Optimistic					Pessimistic
1	2	3	4	5	6

Why is that

8. After today I've changed my opinion of the problem and its solution based on input and perspectives of others in this group

Agree					Disagree
1	2	3	4	5	6

9. Any comments about the process or other aspects of today's meeting?

Thanks for your feedback!

Appendix 3: Structured team reflection questions

Example of team reflection questions

Project team reflective questionnaire

The purpose of this questionnaire is to check how well the project team think it is doing in terms of different aspects of the project and team functioning and to identify ways of improving

Step one (to be completed prior to the meeting) – score out of 10, where 1 = very well and 10 is extremely poorly

You will be asked to provide a justification / explanation for your score.

Please bring to the meeting to share

Step two: (at start of meeting) - As a group share scores. Discuss

As we discuss - List

A) What are we doing well?

B) What needs work

Step Three: Prioritise what needs work and action

	Looking Back	Looking Forward. – Given the score and the context what do we need to do to how can we maintain or improve this?	
	Score	Explanation (brief notes to help with discussion at the meeting)	Explanation (brief notes to help with discussion at the meeting)
Are we (the project team) committed to doing things differently?			
Have we (project team) taken the time to understand the nature of the problem?			
Is there agreement on the nature of the problem?			
Does the project team have the legitimacy to conduct this project			
Do participants seen as experts within their own networks?			

Are we inclusive			
Is everybody that we need to enable co-innovation/change engaging with the project?			
Are they (the above) motivated to change?			
Are people defending entrenched positions?			
Do the participants understand each other's perspectives/needs and interests?			
Are we treating other participants like partners? (Involving/consulting with them in key decisions).			
Is there a feeling amongst the participants that "we are working on this problem together"?			
Process			
Are we (the project team) taking enough time to get each step right?			
Is our process frustrating participants?			
Is our process empowering participants?			
Is our process allowing time for all participants to build trust?			
Are we clearly recording events and decisions?			
Are we clearly reporting back to the various participants?			

Relationships/interactions			
Are historical relationships between participants shifting?			
Is trust between participants improving?			
Are one or two voices dominating discussions?			
Are the participants working towards solutions as a group?			
Are the participants clear on their roles and responsibilities?			
Part 2: Project team (Us)			
Do we have clear roles and responsibility?			
Are we working effectively as a unit?			
Is there a feeling of joint responsibility for success or failure?			
Is the Reflexive Monitor contributing effectively all the time?			
Are we well enough resourced to meet our objectives/goal?			
Are we managing the interactions between participants effectively?			
Do we (the project team) understand the participant's perspectives/needs and interests?			

Will our organisations assist and support us to achieve the objectives/goal?			
Are we confident we can work with others to improve the issue			
Are we comfortable with the time frames we have set ourselves?			
Is our process frustrating?			
Learning			
Are we (the project team) creating an environment for participants to learn (stimulating interactive learning)?			
Are we (project team) learning?			
Do we think the technical group is learning?			
Are we seeking feedback from participants			
Knowledge			
Does the process we have constructed value all forms of knowledge? (i.e., practical, technical, expert etc.)			
Do participants appear to respect each other's knowledge and skills and contribution to the issue?			
Are we learning things which we can transfer to a) Other innovation projects b) other areas within our organisations			

Are our respective institutions facilitating our ability to implement joint solutions?			
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Another example of a structured team reflection

Question / focus area
1. How are the dynamics of the group happening / coming along? <ul style="list-style-type: none"> a. Is there equal participation? Are silent voices actively encouraged to contribute? b. Is leadership functioning properly? c. Are there any power issues amongst participants? d. Are meetings run effectively, with action points and follow up? e. Are meetings well planned and evaluated? f. Is there a work hard play hard ethos? g. Are the group's goals clear, achievable, written down and aspired to? Do they keep the ambition for change in mind? h. Is the group going through the normal phases of Forming / Storming / Norming / Performing i. Does the group have enough resources: time, funding and or expertise? j. Are interaction issues in the group faced and adequately addressed?
2. Are there any issues in the environment that needs to be addressed, e.g. markets, written rules, policies, laws, "how we do things around here"
3. Are any new role players required to stimulate innovation, or have any become redundant?
4. Is there conflict in the group? How effectively is conflict managed; by whom? Is the conflict constructive or destructive?
5. Are there any opportunities for the group that are not being seen or not tapped into?
6. Is co-innovation happening - in the Innovation Project? <ul style="list-style-type: none"> a. Any entrepreneurial activities happening? What are they?
7. Is co-learning occurring - in the Innovation Project? <ul style="list-style-type: none"> a. Are participants learning from each other? b. Are all forms of knowledge respected and utilised?
8. From the above, what is the most urgent issue in the group that needs to be addressed? Write it down (and check with a trusted person):
9. How and when I will address the issue:

Appendix 4: Reflexive Monitor Process Checklist to check group functioning against the 9 principles of Co-innovation.

	Comments	Intervention needed?	How/what?
Take the time to understand the problem from many different views			
1. Are people trying to understand the problem before jumping to solutions?	People take the time to explore the problem further before providing solutions	Yes/No	
	There is a mix of behaviours: some people are considering the problem others are proposing solutions		
	A range of solutions are immediately provided by almost everyone (e.g. technologies, education plans)		
2. Are different views represented?	A range of people are present and giving a range of views	Yes/No	
	There is a range of people but some obvious views are not represented		
	There are only a few views represented among the participants		
3. Is there agreement on the nature of the problem?	All participants have agreed on the nature of the problem	Yes/No	
	Half of the participants agree on the nature of the problem		
	There is general disagreement on the nature of the problem e.g. people hold their own views		

4. Do the participants understand each other's views, needs and interests?	All the participants are able to articulate each other's views even though they might not agree	Yes/No	
	Half of the participants are able to articulate each other's views		
	None of the participants are able to articulate each other's views		
Be inclusive			
1. Is everybody that we need for creating change engaging with the project?	Everyone that affects or is affected by the problem is present	Yes/No	
	Some of the people that affect or is affected by the problem are present		
	Very few participants that affect or affected by the problem are present		
2. Is there a feeling among the participants that we are working on this problem together?	All the participants of the participants feel that they are working together on this problem	Yes/No	
	Some of the participants feel that they are working together on this problem		
	Most of the participants feel that they are not working together on this problem		
3. Are we treating all the participants as partners?	All the participants make collective decisions and share responsibility for the groups actions	Yes/No	
	Some of the participants are making decisions and share responsibility for the groups actions		
	Only a few participants make decision and take responsibility for the groups actions		
Value All sources of knowledge			
	"I don't see how that is relevant" OR "I don't think you understand the issue"	Yes/No	

1. Do we value everybody's input equally?	"Thank you for your input" OR "I'm not quite sure how this relates to the topic"		
	"I've never thought about it that way" OR "Thank you for your contribution, that is really insightful"		
2. Are there any voices or opinions dominating the discussions?	Is everyone listening to each other?	Yes/No	
	There is 1 or a few participants talking over everyone else		
	Nobody is listening to each other and they keep interrupting each other		
3. Are we integrating all participant sources of knowledge to create novel approaches?		Yes/No	
Learning and listening together			
1. Are we open to new ideas?	"We've never tried that, but it sounds like a good idea"	Yes/No	
	"Possibly, but shall we try the other options first"		
	"No, we don't do it like that"		
2. Are we actively listening to each other's ideas and views?	"That is a great idea, I really like it. Perhaps we can use that and add in this part?"	Yes/No	
3. Are (historical) relationships between the participants changing? In what direction?	The ways that people work together are changing, e.g. the council wants to participate in the research rather than only funding things	Yes/No	
	The ways that people work together are slowly changing and have shifted slightly, e.g. the council is checking in regularly on how the research is progressing.		
	Things continue the way it also was been, e.g. the research is commissioned by the council and is presented back at the end.		

4. Are we defending entrenched positions?	Traditional adversaries are working together	Yes/No	
	Traditional adversaries are starting to discuss and listen to each other		
	Traditional adversaries are still holding the same positions and are not communicating		
5. Are participant's views evolving over time? (Benchmarking)	All the participants views have evolved over time	Yes/No	
	Some of the participants views have evolved over time		
	None of the participants views have evolved over time		
Shared vision			
1. Is there a shared vision?	The group has taken the time to work on the problem definition and everybody has bought in to it	Yes/No	
	The group has discussed what the problem should be but hasn't bought into it yet.		
	The problem definition was assumed, however everybody still sees this differently		
2. Do we have a feeling of joint responsibility towards achieving a shared vision?	All participants feel responsible, because they recognize they can't do it on their own and they know where their role starts and finishes.	Yes/No	
	Some of the participants feel responsible, however it is unclear what the roles are amongst the different participants		
	None of the participants feel responsible, they all think somebody else should solve the problem/ One of the participants think they can do it on their own and don't want to include the others.		
3. Are we acting to bring about the shared vision?	"Let's get together to discuss further how we get this going and define some actions"	Yes/No	
	"We'll meet at the next planned meeting to think about this a bit more"		

	"I'm not able to do anything at this moment" OR " I don't have time to think about this in the coming 6 months"		
4. Do we regularly revisit the shared vision?	At key points in time people are asking: "Do the actions still connect to the vision?" OR "Is the vision still appropriated given the recent discussions?"	Yes/No	
	On an occasional basis people are asking: "Do the actions still connect to the vision?" OR "Is the vision still appropriated given the recent discussions?"		
	People want to keep moving regardless of the shared vision: "The vision is set, let's just do it!" OR "There is no need to keep looking back at it, we now need to work on solutions"		
5. Are we measuring progress towards the shared vision?	Monitoring and evaluating progress within the project is done systematically	Yes/No	
	Monitoring and evaluating progress is done occasionally		
	Progress isn't monitored and evaluated throughout the project, but only at the end.		
Be honest, open and constructive			
1. Are there underlying tensions within the group?	People are happy to mix and have random conversations about all topics with each other. There is a lot of eye contact	Yes/No	
	Some people are happy to mix but avoid certain people or topics		
	The participants stick to their 'allies' and won't discuss a certain topics. The participants avoid looking at each other when certain issues are mentioned.		
2. Are people stating their positions or views?	All participants have an open and free conversation about their views.	Yes/No	
	Some of the participants are expressing their views		
	None of the participants are expressing their views – awkward silence.		
	Full eye contact with the other participants	Yes/No	

3. Are people comfortable doing that?	Some avoidance of eye contact between some of the participants		
	Complete avoidance of eye contact between participants		
4. Is there trust among the participants?		Yes/No	
5. Are we willing to constructively work through differences of opinion?	“Ok, let’s talk about this and work it out” OR “Let’s get this issue sorted” OR “You think A, I think B, let’s find some middle ground”	Yes/No	
	Recognizing there is an issue, however not willing or able to work it through.		
	“I’d say we need to do this and we need to do it now”		
Sticking with the process			
1. Is our process frustrating the participants?	All of the participants are happy to work through issues and take time to do so with everybody that needs to be included.	Yes/No	
	“Yes, it is frustrating but we see the need for doing it”		
	“It is to slow (or to fast), to many people, too hard to work with them”		
2. Do we take enough time to get each step right?	All the participants are comfortable enough with the state they are in to continue	Yes/No	
	Some of the participants are comfortable enough with the state they are in to continue		
	None of the participants are comfortable enough with the state they are in to continue		
3. Are we working through conflict as it arises?	All participants are willing to work through conflict when it arises (with help of an RM)	Yes/No	

	Some of the participants are willing to work through it when it arises		
	None of the participants are willing to work through conflict or don't notice when it arises.		
4. Are we committed to do things differently to create innovative solutions?	"Yes, we want to do things differently because what we've been trying isn't working"	Yes/No	
	"I'm not sure if what we are doing is working, maybe it is time to try something different?"		
	"Let's continue with what we are currently doing with a few modifications to see if that works"		
Be flexible and adaptable			
1. Are we clear what is expected of the participants?	All participants are clear on what roles, timeframes and behaviours are expected of them (guidelines)	Yes/No	
	Some of the participants on what roles, timeframes and behaviours are expected of them (guidelines)		
	None of the participants on what roles, timeframes and behaviours are expected of them (guidelines)		
2. Do we recognize our own and each other's strengths and weaknesses?	"You guys are really good at this, why don't you do it?"	Yes/No	
	"I don't know you can contribute, but maybe we can talk about it"		
	"We can do it all, what do we need you for?"		
3. Are we willing to change direction if needed?	"I really don't think this is working, maybe we should try something else?"	Yes/No	
	"Let's give it a bit longer, and see in a few weeks' time if it is still not working"		
	"We made the plan, let's stick to it"		

4. Are we willing to bring in new people if needed?	"We probably don't have the right expertise at the table; maybe we should invite A to our next meeting?"	Yes/No	
	"Is there somebody that we know that can do this for us?"		
	"I don't think the group needs to get any bigger"		
5. Are we willing to change roles or take on other responsibilities to meet shared vision?	"I normally wouldn't do that but I'm happy to give it a go" OR " We would normally do this ourselves but you would be better at it/have more time to do it/ Are better located to do it/it will be a good learning opportunity for you"	Yes/No	
	"Let' think about these roles a bit later"		
	"I don't have time to do this" OR "I always do this, therefore I should do it now"		
Be aware of wider context			
1. Do we take external influences into account?	"How does the change in the NZ Dollar affect our problem?" OR "What if we have another drought?"	Yes/No	
	"The weather might be something that could potentially affect this idea but let's deal with that when it happens"		
	"This solution will (have to) work no matter what" OR "This is suitable for every farm in every location"		
2. Are we looking out for external influences?	"What is happening with the exchange rate right now?" OR "Did anyone see the long term forecast?" OR "Did you see that on the news last night?"	Yes/No	
	Some of the participants are trying to include some external influences. "I really should try to keep up with what is happening out there"		
	The participants have a tunnel vision when it comes to their problem		
3. Are we aware of other project activities which could impact (positively	All participants are well networked and know who's working on what, when and where. "Did you know about A's project on X? They might have some information on this topic"	Yes/No	

or negatively) on our project?	Some of the participants are well networked and know who's working on what, when and where		
	None of the participants are well networked and but have no knowledge on who's working on what, when and where.		
Process			
1. Is our process allowing time for participants to build trust?	There is enough time in the process for participants to get to know each other and socialise	Yes/No	
	There is some time in the process for participants to get to know each other and socialise		
	No time is allowed in the process for participants to get to know each other and socialise		
2. Are we clearly recording events and decisions?	All events and decision are recorded and the responsibility for recording these is allocated	Yes/No	
	Some events and decisions are recorded; it is unclear whose responsibility this is.		
	None of the events and decisions are recorded, it hasn't been considered		
3. Is our process allowing for creativity?	There is enough time in the process for creative thinking, brainstorming, to undertake activities that in first instance seem unrelated	Yes/No	
	There is some time in the process for creative thinking, brainstorming, to undertake activities that in first instance seem unrelated		
	No time is allowed in the process for creative thinking, brainstorming, to undertake activities that in first instance seem unrelated		
4. Are we clearly reporting back to the participants?	After every event or meeting notes are taken and shared with all the participants (also those that couldn't attend), and someone is responsible for this?	Yes/No	

	Once in a while notes are shared with all the participants (also those that couldn't attend), it is unclear for this responsible for this		
	No notes are taken and it hasn't been considered		
5. How do we deal with outsiders?	All participants are welcoming and happy to include others and share views and insights.	Yes/No	
	Some of the participants are welcoming and happy to include others and share views and insights.		
	None of the participants are welcoming and happy to include others and share views and insights.		
6. Are we well enough resourced to meet our objectives?	None of the participants are complaining about a lack of time or money to undertake activities	Yes/No	
	Some participants are complaining about a lack of time or money to undertake activities		
	All of the participants are complaining about a lack of time or money to undertake activities		
7. Is our process empowering participants?	"I can see what I need to do and how I can go about it" OR "I really feel we can make a difference"	Yes/No	
	"I know what I need to do, but I need some more training to be able to do it"		
	"I feel restricted in what I can do and say"		
8. Do we have the institutional support from our own organisations?	"My organisation is happy to fly me in for that meeting" OR "My organisation can see the value of us meeting again soon"	Yes/No	
	"There is room to negotiate but I'll have to have some more evidence to support my argument"		
	"I don't think I will be able to convince management to do that"		

Do we as a group have the mandate to do this?	This group has the respect and the permission of the industry at large to undertake the activity	Yes/No	
	This group has the respect and permission of some of the industry to undertake the activity		
	This group has no permission or respect of the industry to undertake this activity		