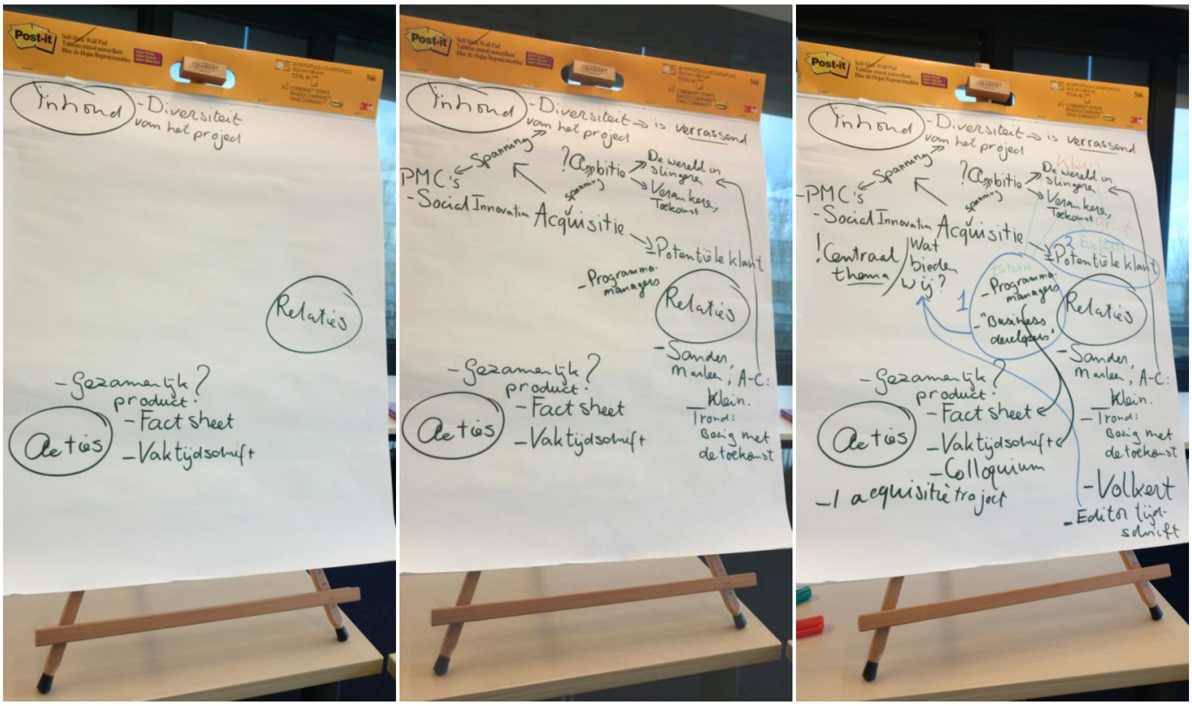
Learning mirror

Additional tool for **Reflexive Monitoring in Action**



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Foreword

This is a supplement to the guide Reflexive Monitoring in Action (RMA)[i], a methodology to support initiatives for system innovation, whether projects, programmes or movements. The supplement presents an additional tool for RMA, the Learning mirror (nr. VIII). As the other tools it aims at 1) keeping the ambition of achieving structural change high and preventing innovators to relapse into old, unsustainable patterns of thinking and acting, and 2) ensuring an equal input of the diverse actors involved.

The main purpose is to link new ideas and relationships with proposed actions in a logical manner and if necessary, reflect on the context of the system innovation initiative. The Learning mirror adds to the mix of existing tools by its very low preparatory requirements. It can be used within the context of regular meetings in an initiative and does not require a specific set-up in the form of a learning workshop or otherwise. It was applied for the first time in STAP, an initiative for change within the value chain of the greenhouse sector of entrepreneurs and knowledge workers. In addition, it was applied in several other situations and presented to a wider public of researchers and innovation facilitators during a theatre debate.

The development of the tool has been made possible by the Dutch NWO-programme Responsible Innovation (Maatschappelijk Verantwoord Innoveren, MVI) and is one of the results of the research programme Network Interventions by Private Partners for Responsible Innovation (NIPPRI). I am thankful for the fruitful exchange with the innovators in STAP and the Sustainable Dairy Chain and want to thank especially Peter Duijvestijn, Coen Hubers, Peter van der Sar, Gerben Splinter, and Petra Tielemans.
It was a more than great pleasure collaborating with the dedicated, inspiring post-doctoral researchers PJ Beers and Anne-Charlotte Hoes, who conducted the main parts of the research and I am very grateful for the input, support and feedback of Volkert Beekman, Alfons Beldman, Cees Leeuwis and Joan Reijs.

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Contents

Summary Reflexive Monitoring in Action

Reflexive Monitoring in Action[ii] (RMA) is an interactive methodology to encourage reflection and learning within groups or networks of diverse actors that seek to contribute to system change in order to deal with complex problems. It builds on the assumption that recurrent collective reflection on the current system (barriers as well as opportunities) helps to stimulate collective learning and to design and adapt targeted systemic interventions. While doing so, these system innovation initiatives develop and/or change local rules, practices and relations within the network of actors involved. This takes place in the muddiness of everyday struggles of change trajectories.[iii]

Key to this methodology is, first, recurrent reflection on the institutional setting in relation to long-term ambitions and concrete actions and their effects and, second, the support and evaluation of on-going system learning and institutional changes. Reflexivity is the outcome; the emergent property of an intervention programme or bottom-up innovation initiative developing new coordinated practices while the rules of the game change along in the process of designing new systems.

RMA builds on the premise that, although the contribution of a single system innovation initiative to a long capricious system innovation process cannot be assessed, it is possible to characterise the actions of a project and the associated outcomes in terms of their relevance for system innovation. The innovation process is evaluated with the aid of theories about societal change processes, including communication, learning, network building and conflict management as well as sociological and institutional theories about system innovation and social practices specifically. Originally, RMA was developed for small-scale initiatives towards system change. Over the past decade, being applied in around 20 projects and programmes with groups of diverse actors, the methodology has developed into a coherent body of basic starting points, principles and intervention strategies. It has been taken up by a range of European and international research and training programmes.

Reflexive monitoring can be an integral part of the change initiative (a project, a programme or cluster of network activities). In practice, a person takes the role of reflexive monitor, whether a hired person, or someone from the project team. The reflexive monitor usually starts with observing how the ambition to systemic change is articulated, whether learning is taking place and ambitious collaborative actions are being designed and carried out. This happens at moments of interaction, when the initiators meet. The reflexive monitor's frame of reference is the particular system innovation ambition as articulated by the initiators. This is the drive to develop new ways of working with associated new rules, relations and material artefacts.

Challenges encountered on the pathway towards change, such as resistance from outsiders, define the activities of the reflexive monitor. Hence, the reflexive monitor is not only an observer but also a facilitator and a sparring partner, with sufficient distance to take a critical stance if needed. In various ways, s/he encourages participants to reflect upon the relationships between the project activities and results and its institutional setting, and the ambition to change in both short-term actions and long-term goals and future perspectives. In this way, RMA addresses the mechanisms that provide stability to the unsustainable system.

RMA tool selection matrix

The selection matrix serves to assist reflexive monitors in choosing the right tool for a specific challenge encountered in a system innovation initiative. It describes situations in which each tool can be beneficial. The learning mirror has been added to the original matrix.

When exploring which tool to use in a system innovation initiative, think of 1) the phase the initiative is in, and 2) the concrete challenges threatening the project's ambitions. You will probably end up with a shortlist of tools. In the guide and this supplement you find the in-depth tool descriptions, to make a final decision.

RMA-TOOL **SITUATIONS IN EACH PHASE**	Learning mirror	System analysis	Actor analysis plus causal analysis	Dynamic learning agenda	Indicator sets	Reflexive process description	Audiovisual learning history	Timeline and eye-opener workshop
Design								
> Network composition								
An insufficient picture of who the relevant actors are	(X)	X	Xa		X			
Insufficient insight into the interests of the relevant actors	(X)		Xa					
A lack of clarity about actors' perspectives on problems and solutions	(X)		(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)				
> System approach								
Participants focused primarily on the barriers rather than the possible solutions	(X)	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			X
Ambitions being diluted, e.g. because of distraction by the everyday details	X	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	X			
Participants meet resistance from their own organisations or supporters	X		(Xa)		(X)		X	X
Transition to the next stage stagnating	X			(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	(X)		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

X: primary function of a tool; (X): secondary function of a tool; Xc: causal analysis; Xa: actor analysis

VIII. Learning mirror

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Introduction

In the 'act' phase participants in system innovation initiatives regularly meet to discuss ideas, plans, actions and their results and to reflect on progress, future ambitions and more. This happens for instance in project team or board meetings or during more occasional events in a workshop setting. In this phase, it can be quite a challenge to convert ideas and long-term ambitions into innovative collaborative actions, for instance when participants adopt a wait-and-see attitude, encounter or anticipate resistance from their constituency or potential partners or when everyday details dilute their ambitions. Moreover, their awareness of the constantly changing context may be diminishing. 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.

The Learning mirror triggers:

- Reflection on the connection between the three learning dimensions: 1) content regarding problems, future visions and solution options, 2) personal / organisational relations, and 3) options for real-world actions[iv].
- Reflection on how proposed actions relate to a system innovation initiative's changing context and how the initiative can act more effectively *vis-à-vis* that context.

It consists of two parts. Part 1 visually documents, during a meeting, the various contributions of the participants and possible blind spots; this is the actual mirror. It summarizes the conversations by structuring it into the three categories of content, actions and relations. Part 2 consists of an inquiry framework to relate proposed actions to the changing context in order to make them more effective in changing it.

The first part of the Learning mirror requires little preparation and only minimally interrupts the 'natural' conversation. It takes what people say during a meeting as the starting point. It is especially useful in situations in which participants of a meeting do not (in)tend to reflect. The Learning mirror can easily be applied in a regular project meeting. For that reason, it is practical in case the reflexive monitor has little opportunity to influence the meeting's agenda and goals and/or little space for giving feedback during a meeting.

The second part will only be carried out if the reflexive monitor thinks or the participants think it is essential to trigger more reflection on the effectiveness of the initiative to change its context. To operate effectively, the monitor needs to gain legitimacy in the group to intervene directly and explicitly in the conversation at an agreed moment.

Comparison with the Dynamic Learning Agenda

Both the Dynamic Learning Agenda and the Learning mirror are used to encourage participants to take action in the light of challenges hindering them to realise their long-term system innovative ambition. They both do so by observing and structuring meetings. An important difference is that the Learning mirror (part 1) does not require any preparation, while the Dynamic Learning Agenda requires the monitor to reveal the core challenges first. The latter tool explicitly aims to keep focus on these barriers and obstacles and transform them over time into learning goals and solutions to overcome these barriers. A second difference is that the learning mirror does not include the institutional context (defined as the core challenges) from the start as in the Dynamic Learning Agenda. In contrast, in the Learning mirror the changing institutional context is addressed only if necessary, and if so, this is done explicitly with the aid of the inquiry framework to scrutinize the boundaries between initiative and context.

Comparison with Indicator Sets
The Indicator Sets and the Learning mirror are both theory-driven tools with an explicit focus on the effectiveness of a system innovation initiative *vis-à-vis* its context (the incumbent, unsustainable system). There are two main differences. The Indicator Sets are applied by the reflexive monitor who as a social scientist gathers data, also by attending meetings, and analyses these to form conclusions about the progress of an initiative. This interpretation is checked with managers and if possible participants. With the Learning mirror the conclusions are arrived at in a fully participatory process, using the same language as the participants, without making the underlying theoretical notions explicit. The second difference relates to the perspective on progress. The Indicator Sets depict the success of an initiative as a development from low-level changes to higher level changes (such as from gaining new insights at the group level to institutional change in the main organisations of a sector). The Learning mirror (part 1) shows progress in the form of learning about new topics that arise again and again in changing coalitions.

Approach
The Learning mirror can be used in meetings such as project meetings with about 4-10 participants, but can also be used in settings with up to 25 participants. It is most useful for relatively complex agenda items that require collaborative actions and those parts of the meetings that are key to making progress in the innovation process. As the reflexive monitor you attend those meetings and document the communication on a board or flip-over page in order to stimulate the participants to seek alignment between the contents, relations and actions. This is done in part 1.

The purpose of part 2 of the Learning mirror is to collectively reflect on the innovation initiative's environment, based on the documented communication in part 1. You trigger the participants to think about possible opportunities and obstacles in the initiative's context that might respectively support or hinder the system innovation ambition. It is especially useful when an initiative is primarily concerned with its internal logic, and treats its context as given.

Preparation
Prior to the meeting, reflect personally on whether it seems useful to stimulate reflection on the learning dimensions or on the relation between initiative and context. In case of the latter, it is useful to explore inquiry frameworks (see below, part 2). Then, discuss the expected value and application of the Learning mirror with the chairperson of the meeting and perhaps the project managers as well. Decide together which items on the agenda or parts of the meeting might benefit most from using the tool. Also inquire whether you will be allowed to offer reflections spontaneously or only on request.

For the chairperson it is important to know what to expect from the application of the Learning mirror and the presence of the reflexive monitor. It enables the chairperson to explain your presence and role at the start of the meeting, ask for agreements, and at later moments request summaries and reflections.

Part 1: Documenting the communication and reflecting on content, relations and actions
Part 1 of the Learning tool consists of three steps: 1) documentation 2) verification and 3) reflection. It results in the recording of the learning process. These steps are taken iteratively, starting anew whenever needed.

Step 1:
Start with an empty flip-over page or black- or whiteboard for each new item or part to be documented. Ensure that all participants can see you as well as the board and ideally are also able to read what you write down. Write down the words “Content”, “Relations” and “Actions” as far apart as possible; these are the three learning dimensions:
1) content regarding problem definitions, future visions and solution options;
2) relations with persons / organisations mentioned in relation to the discussion topic; and
3) options for collaborative, real-world actions.
Summarise by categorising the various contributions in the conversation according to the three learning dimensions. You may want to use three different colours. Carefully listen to the exchange between the participants. Make use of the participants’ wording as much as possible. For each new contribution to a discussion topic jot down keywords or short sentences that summarise it. A new contribution is for instance “The banks also have quite some influence on entrepreneurs currently” in a discussion on interest rates for investments.

Step 2:
During the conversation you verify your notes with the participants a few times. The longer the conversation on the specific topic takes and the more complex it is, the more often you check. You verbally summarise the discussion up to that moment and check whether the participants want to add or change something. The participants need to agree on your documentation. Hence, verification is also important if the text on the board is visible for everybody.

Step 3:
The verification may end in a reflection by you. You can give your reflection on request or your own initiative. In our experience, chairpersons or participants may well ask for a short summary. The monitor can also wait for the right moment to give an impulse to the discussion. The three main issues for reflection are:
1. Whether there seems to be a balance between content, action and relations
2. Whether these three dimensions are aligned, and there is a balanced level of elaboration of each.
3. Whether the alignment provides a new outcome for the initiative, in the sense of desirable and feasible solution options.

Participants may have clear suggestions for novel actions for instance ideas about possible solutions, but not what added value it has content-wise, or when content and relations are discussed but no-one has mentioned any actions. In that case you ask what they think of it. In addition, you reflect on whether content, relations and actions are logically aligned. This can be done by asking the participants what relations exist given the reported conversation on the board or by giving your interpretation of (missing) relations. In both cases you draw arrows between the dimensions. Again, you check whether the participants find the alignment between the dimensions satisfactory by asking open questions. Finally, if you think the participants have been repeating earlier discussions, you ask questions about novelty or give your feedback on it.

Result:
When the content, relations and actions have become aligned, the notes of the Learning mirror represent the learning process related to the agenda item or part of the meeting. It shows the content, relations and actions with logical interconnections as discussed by the participants, while it has supported the learning process. Additionally, your notes constitute an agreed representation of what has been discussed. After the meeting, you can take pictures of your notes to share with the participants, as an initial way of reporting.

Part 2: Provoked reflection on the effectiveness of the relation with context
You can provoke reflection on the context in two ways. 1) You introduce an inquiry framework and use that in a workshop-like setting; or 2) you prepare well, by getting acquainted with the potential and questions of an inquiry framework and use similar questions in a more subtle way, during a natural conversation.
There are two main steps: 1) preparation and 2) inquiring.

Step 1:
First, you choose what inquiry framework seems best. The box below presents the RMA inquiry framework. It consists of questions to provoke reflection on the relation between initiative and context regarding the main dimensions of the system innovative ambition of the initiative[v]. Another relevant inquiry framework is designed by Ulrich and Reynolds to critically question the socially constructed boundaries of a system, as a result of which certain issues and actors are included while others are excluded.[vi] This methodology to identify and debate boundary judgments consists of twelve critical boundary questions about the sources of motivation, control, knowledge and legitimacy. In this way, it also addresses power differences. Alternatively, you can use the framework for Responsible Innovation, if you think the initiators neglect possible negative future consequences of the system innovation they pursue, or consider the ethical dimensions of their choices insufficiently.[vii] This might especially be the case if only a single solution is advocated.

The questions in such frameworks are suggestions to inspire you to formulate relevant open questions. Depending on the specific challenge encountered by the initiative (see tool selection matrix) you think about what part of the questions can be used.

RMA Inquiry framework

- **Content:** Whose perspectives and future visions (within the initiative or externally) have been taken into account in the actions we propose and undertake? Which have been ignored or even dismissed? Which values are implied in the (proposed) actions?

- **Actions and practices:** Which everyday practices should change and in what direction? Have we ourselves started doing things differently than before? How do our actions complement each other and support achieving the long term ambition of system innovation? How do others expect us to behave and what does that mean for us?

- **Relations:** What are the implications of our actions for external actors? How are they involved? How do our relations with them change? With what innovating actors do we build up promising relations? Which hindering relations do we (try to) break down?

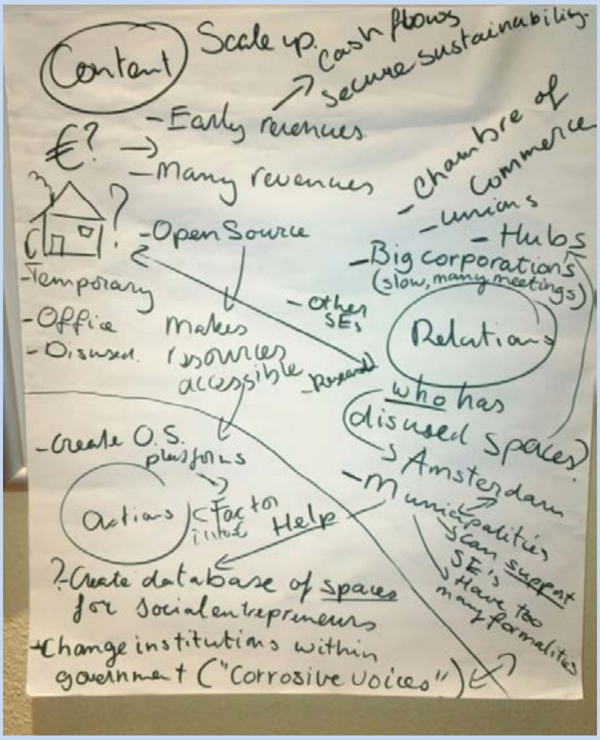
- **Rules:** Which rules, values and norms need to change to enable the desirable changes of daily practices and relations? What are other main institutional obstacles? Which external developments offer important opportunities? How can we take advantage of the opportunities and tackle the obstacles?

Step 2:
You inquire into the relation between initiative and the context during a meeting, for instance, at the end of a discussion or at the beginning of a subsequent meeting. In these cases, you introduce the ‘new’ topic of reflection. Especially if the participants desire to reflect on the context you could introduce the inquiry framework itself as well. Alternatively, you integrate this reflection into step 3 of part 1. In that case, it will be less visible for the participants. A second alternative is to do the reflection with a smaller group after a meeting, while sparring with the project team and the project manager about the results of the meeting and next steps in the initiative.

In any case, you will have to adapt the prepared questions to the conversation. Some questions may already have been answered during the discussion, others may no longer seem relevant or it seems not to be the right moment for asking them.

Example of the learning mirror (part 1)

The learning mirror was applied in a workshop dialogue about initiatives of up-scaling social entrepreneurship. The participants were part of an international network of researchers and policy makers. The aim of the dialogue was to identify ways to strengthen social entrepreneurship. During the dialogue on one specific initiative, participants discussed factors associated with strengthening social entrepreneurship, such as revenues, working in an open source fashion, and acquiring space (content). See the documented communication in the Figure. The sheet also shows which related actors were discussed, such as hubs and municipalities that might provide spaces, and the actions to create a database of spaces for social entrepreneurship, together with the municipality. This latter alignment between content (need for space), relation (municipality as provider of space) and action (creating a database) is a learning outcome of the dialogue. When the monitor pointed out that the important issue of revenues was not aligned with relevant actions yet, a discussion on that topic followed.



Pitfalls and solutions

Pitfall	Solution
The use of 'learning' terminology causes resistance. Participants may see it as an individual process of knowledge increase or competence building or see social learning as too 'soft' an approach.	Do not use learning terminology. Focus instead on the innovation journey to success as a process of discovery in which collaboration is needed. The tool could be called 'Meeting mirror' or simply 'Meeting tool'.
The reflexive monitor or participants strive to get 'the complete picture' before identifying actions.	Remember or explain that a complete analysis is neither the goal nor feasible given the complexity. It is 'just' to increase system understanding in order to identify actions that are meaningful in the light of the system innovation ambition.
Asking many reflective questions increases the complexity so much that it causes frustration and an energy drain.	Focus on a few key issues which seem most important and apply appreciate inquiry. Or if necessary, stop the reflection, and instead collectively diagnose the causes of frustration in the group and agree on how to continue a next time.

Participants are becoming impatient or feel they are forced into taking actions as a consequence of the use of the learning mirror.	Emphasise that it is legitimate not to identify an action for every discussion topic. Many topics need time, additional analysis and iterative reflection before defining possible actions and deciding on who will do what. Explain that the aim is to verify whether actions should be identified or not.

Other applications

The Learning mirror is primarily useful for challenges in the act phase by drawing attention to the alignment between actions, contents and relations and relating actions effectively to a changing environment. However, it can also be used in case of other challenges for an innovation initiative

An insufficient picture of who the relevant actors are

In part 1, by documenting relevant relations, the Learning mirror can also be used to draw attention to actors not yet listed, whom the participants might be overlooking. This holds true even more for part 2, which specifically draws attention to external persons / organisations that might be of relevance to the proposed actions of the initiative.

Insufficient insight into the interests of the relevant actors

The interests of relevant actors are not an explicit part of the Learning mirror. However, actors, content and relations are often linked by interests. When, using part 1, the monitor helps exploring the logical links between content, relations and actions, often the associated actor interests are discussed as well.

A lack of clarity about actors' perspectives on problems and solutions

Like with interests, the Learning mirror can often help yielding insight in participants' perspectives and problem orientations when the monitor uses part 1 to explore logical links between content, relations and actions. If part 2 leads to an awareness of lacking insight regarding external actors, it may trigger the actual exploration of these perspectives.

Participants focused primarily on the barriers rather than the possible solutions

This happens particularly when participants explore the deeper causes of an issue. By triggering making connections between content, relations and actions, the Learning mirror helps to identify solution options.

Lack of progress or a poor picture of the progress

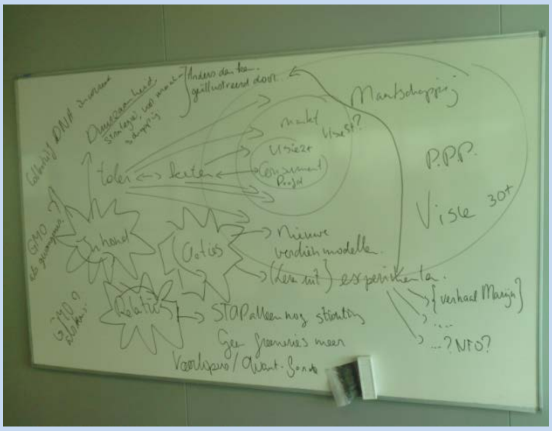
The Learning mirror does not explicitly document progress as a linear process from less to more, because it jumps from topic to topic. It does however track which and how many issues content, relations and actions become interwoven during meetings. Over time, if the Learning mirror has been applied in a series of meetings in which the same topics re-occur, the reports can be used to make a learning history of the main issues' evolvement and in this way of the innovation initiative.

Experience

Chain innovation in the Dutch greenhouse sector

STAP was an innovation initiative of greenhouse growers. It means Foundation for Strengthening the Sales and Marketing Position of Greenhouse Vegetable Producers in the Netherlands (in Dutch: STichting versterking Afzetpositie Producenten van glasgroenten in Nederland). In 2011, STAP was founded by a network of greenhouse growers, researchers, educational institutes and intermediaries. At the beginning of the reflexive monitor's involvement, STAP consisted of an executive board and a larger general board, both composed mainly of greenhouse growers. Furthermore, STAP was setting up a platform of universities, educational organisations and intermediaries, which got established as the chain knowledge platform. STAP's goal was to innovate the greenhouse sector in order to make it more market and society oriented, as a way of dealing with the bad market position of greenhouse growers. Earlier, STAP had organised workshops for growers to raise awareness about the issues facing the greenhouse sector. These however did not have the desired effects. Hence, STAP was looking for new strategies towards innovations, mainly aimed at striking new alliances with actors further down the production chain. In a later stage, its efforts increasingly focused on transition towards a societally sensitive greenhouse sector. In this period of transformation, the reflexive monitor attended two meetings of the general board and nine of the chain knowledge platform in the year 2013 (See Figure 1).

On October 29th of 2013, the Learning Mirror was applied for the first time, basically because the reflexive monitor expected it would support the learning process and wanted to test the assumptions about its value and use. He started using it by mentioning that he would be "collecting minutes" after he had attended earlier meetings and given feedback and advice in other ways. The Figure shows the documented conversation of this meeting (in Dutch).



The experiences with part 1 of the learning mirror were as follows. The structuring in the three dimensions clearly helped to pay attention to neglected issues. This happened almost by itself. Just by writing down what was discussed and what not, the participants noted what missed and started filling it in: "We still need to discuss actions." As a result, new options for actions were considered. Some of these were soon carried out. For instance, in the beginning of 2014 a new idea emerged to work on greenhouse growers' market position, seemingly without building on STAP's experiences. In the lengthy discussion no concrete actions were mentioned. Within ten minutes after the reflexive monitor had pointed this out, the participants had contacted a representative of another initiative and planned a meeting with him. In this way, the relative distance by the presence of the monitor using the board, provided the group the necessary room to reflect on the learning process. A challenge for the reflexive monitor was however, to ensure that the notes were not seen as "PJ's document", (PJ being the reflexive monitor), instead of the result of the discussion and hence of the input of all participants.

Part 2 proved especially useful for exploring the positions of external actors. In one meeting, using some questions of the RMA inquiry framework helped to uncover no less than three different activities from different parts of the Ministry of Economic Affairs, all with different repercussions for the activities of the

STAP Chain Knowledge Platform. The discussion provided more insight in the potential for changing the external environment, by making clear that different parts of the Ministry represented different positions. A main lesson for the monitor was that it is not effective to do a reflexivity check at every meeting. At one point, it caused frustration among the participants, because by increasing the complexity, achieving any relevant result seemed impossible. Since then, part 2 was used more sparingly or more implicitly and integrated in part 1 with just one or two questions.

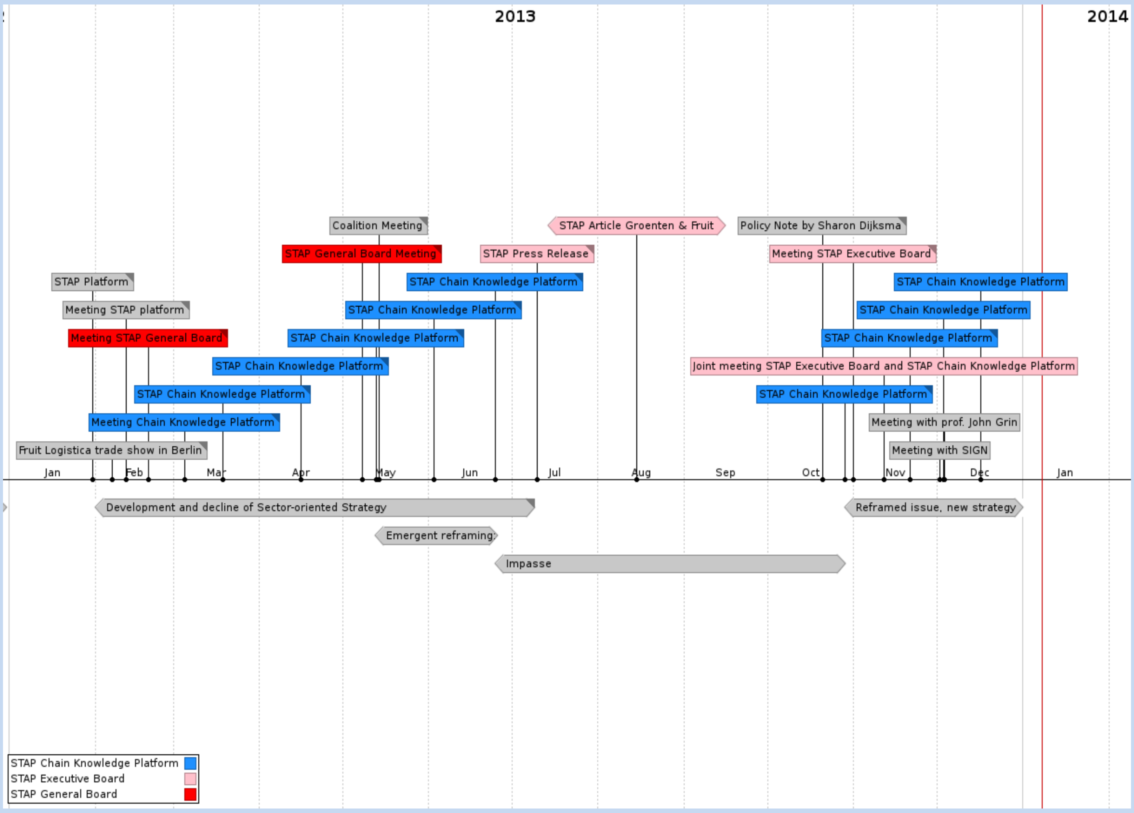


Figure 1: *Timeline of meetings and events of STAP and the STAP Chain Knowledge Platform in 2013*

Endnotes

[i] Guide: Van Mierlo, B., Regeer, B., Van Amstel, M., Arkesteijn, M., Beekman, V., Bunders, J., et al. (2010). *Reflexive monitoring in action: A guide for monitoring system innovation projects*. Oisterwijk, The Netherlands: Boxpress. More information on the website: http://www.wageningenur.nl/rma.

[ii] This summary is based on the following article laying out the key features of and need for reflexive evaluation approaches: Arkesteijn, M., Van Mierlo, B., & Leeuwis, C. (2015). The need for reflexive evaluation approaches in development cooperation. *Evaluation, 21*(1), 99-115.

[iii] The early basics were developed in: 1) Van Mierlo, B., Arkesteijn, M., & Leeuwis, C. (2010). Enhancing the reflexivity of system innovation projects with system analyses. *American Journal of Evaluation, 31*(2), 143-161; 2) Regeer, B. J., A.-C. Hoes, M. van Amstel-van Saane, F. F. Caron-Flinterman and J. F. Bunders (2009). Six guiding principles for evaluating mode-2 strategies for sustainable development. In: American Journal of Evaluation 30(4): 515-537; and 3) Van Mierlo, B., Leeuwis, C., Smits, R., & Klein Woolthuis, R. (2010). Learning towards system innovation: Evaluating a systemic instrument. *Technological Forecasting and Social Change, 77*(2), 318-334.

[iv] For a theoretical explanation of the choice for these three dimensions, see Beers, PJ., Hoes, A.-C., & Van Mierlo, B. (2014). *Towards an integrative perspective on learning in innovation initiatives: The case of the Dutch greenhouse sector*. Paper presented at the 11th European International Farming Systems Association.

[v] Van Mierlo, B., Van Amstel, M., Arkesteijn, M. & Elzen, B. (2010). Keeping the ambition high. The value of reflexive monitoring in action for system innovation projects. Paper presented at SISA II: International workshop on System Innovations, Knowledge Regimes, and Design Practices towards Sustainable Agriculture. Lelystad, The Netherlands 16-18 June 2010.

[vi] Werner, U., & Reynolds, M. (2010). Critical System Heuristics. In Reynolds, M. & Holwell, S. (eds.) *Systems approaches to managing change: A practical guide.* London: Springer, The Open University. See also the website http://wulrich.com/csh.html.

[vii] See Table 1 in: Stilgoe, J., Owen, R. & MacNaghten, Ph. (2013), Developing a framework for Responsible Innovation. *Research* Policy 42(9): 1568-1580.