Looking for transitions

Monitoring approach for sustainable transition programmes

Mattijs Taanman

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Looking for Transitions
Monitoring approach for sustainable transition programmes

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Een monitoringsaanpak voor duurzame transitie programma's.

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When I just started working on my PhD, I sat in the Eindhoven bar 'La Folie' with a friend and discussed the word 'history' (or actually the French histoire). In Dutch there are two translations: 'geschiedenis' referring primarily to the chronological description of past events over time and 'verhaal': a story or tale. We considered it well put that the English and French used one word with both meanings. Without the story, the description of events means little. It was a very casual talk and probably took just a few sips of bar-time. However I kept reminding the conversation because it corresponded very well with my PhD work in two ways: in the way I approached monitoring (more as a way to find the story of how transition programmes develop than to collect data) and in the way I struggled with writing the PhD. I was too deeply immersed in different monitoring projects to accurately describe the events and find the overarching story. This meant I had to recreate parts of my research ex post in order to transform projects into units of analysis. To write a proper history according to scientific standards of how this approach to transition monitoring was developed.

So to put it short: for several years I have worked on this PhD thesis. And then again for several years to rewrite it. Now it is done. It should be clear to everybody who has written a PhD, or knows somebody who did, that I therefore owe a lot to a lot of people.

First, the people that took part in the different monitoring projects. I want to thank the programme managers of the nine transition programmes for their time and input. They contributed by designing, implementing and using the different monitoring applications, discussing the value of transition monitoring in general and evaluating the monitoring activities. Then our monitoring team at Drift with Nele, Nanny, Julia, Pepik and Henk. We laughed, struggled and supported each other to get this approach on the road. Special thanks of course to you Henk Diepenmaat, for the many long discussions in which the trivial and the philosophical were always strangely intertwined. My outlook on various things has changed as a result. And maybe would have changed even more if that camel of a dog of yours would not constantly jump through the hedges in your garden.

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CHAPTER 1 THE NEED FOR TRANSITION MONITORING

"The rapid pace of change today frequently exceeds the capacity of national and international institutions to adapt. So many things are changing at once that no organization on its own can keep track of them all—especially as the changes generally cut across traditional boundaries between academic disciplines and professional fields of expertise."

Kofi Annan, 2000[1] on the role of the United Nations in the 21st century

What was true for the UN some 15 years ago, has been true since for all efforts that deal with fundamental changes: no organization on its own can keep track of all the changes. Not just international organizations the likes of the UN are confronted with this, but also national, sectoral and even local efforts dealing with sustainable development. As a response, programmes are set up that act as intermediary, networked, organisations to track, coordinate and stimulate the efforts of change agents. This research explores how programmes that want to influence fundamental, sustainable change processes –sustainability transitions- can monitor changes to become more effective.

Sustainable development requires rethinking and reconstructing current systems including energy production, agriculture and health care. The long-term processes in which such systems change fundamentally are called transitions. Monitoring these transitions is of great help to those that pursue them. If programme managers could precisely describe which transition they seek and how their interventions influence these large scale changes, it would be fairly straightforward to define indicators and monitor progress. We could monitor if the transition and interventions develop as planned. However, we cannot predict and plan transitions in the traditional sense. Transition dynamics and the effects of interventions are surrounded by uncertainties and the involved change agents frame the problems, required goals and means differently. These are therefore not known at the start of a programme, but can only become known through the change process itself.

Programme management is therefore at the core an intensive process of experimenting, linking up developments, learning and adjusting the programme accordingly. This needs to be supported by good information on real-time developments in projects, the programme as a whole and the programme context. So paradoxically, on the one hand, transition dynamics and the effects of interventions to influence them are difficult to predict and therefore monitor, but on the other hand, influencing them requires good monitoring. A type of monitoring is needed that is fit for these programmes. This study consists of empirical and theoretical research to develop such a type of monitoring. This will be referred to as transition monitoring or –in short- TMon.

The first five sections in this chapter further describes what transition programmes are, why they are needed and why they need monitoring. Section 1.1 describes what sustainability transitions are. In section 1.2 sustainability transitions are presented as an unstructured problem. Dealing with such problems through the existing institutions of state and

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[1] *We the peoples, The Role of the United Nations in the 21st century, Kofi Annan, http://www.un.org/millennium/sg/report/*

market requires having real alternatives to current regimes to choose from, sufficient information on these alternatives and advocacy coalitions who have a stake in these options. Realizing such alternatives requires learning, coordination and a continuous interplay between intervention and problem framing. Section 1.3 describes transition programmes as institutions to organize this learning, coordination and interplay between intervention and problem framing and describes how such programmes may be understood from a transition management perspective. Section 1.4 defines transition monitoring as a reflexive monitoring instrument for on-going transition programme development. Developing such an approach draws on and adds to transition studies, programme management and monitoring and evaluation studies. This is described in section 1.5. Section 1.6 describes the research design. The final section presents the outline of the remainder of this study.

1.1 SUSTAINABLE SOCIETIES AND SOCIETAL TRANSITIONS

Sustainable developments is commonly defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987). Studying sustainability requires a systems perspective and the incorporation of values (Hodge 1997). The systemic nature of the concept stresses that sustainability is a cross-cutting concept that crosses economical, socio-cultural and ecological domains and geographical and intergenerational scales (Rotmans and van Asselt 2001; Grosskurth 2005). Sustainability represents a set of values on what type of development should be sought for and what is to be sustained and changed in this development.

Many of the sustainability issues in domains like energy, mobility, food and biodiversity are caused by ways of acting, organizing and thinking that are deeply embedded in, and privileged by current societal systems (Dirven 2002; Grin and Weterings 2005). These systems consist of sets of aligned technologies, rules and actors that together form 'constellations that work' (Rip and Kemp 1998; Geels 2004). These have a characteristic culture and structure that is continuously reproduced by the way we normally go about in our professional or daily lives. These dominant constellations are called regimes. When sustainability issues are deeply embedded in regimes, these regimes need to change fundamentally to realize sustainable development. Such system changes go far beyond changes in individual technologies, rules and actors, and are referred to as transitions. Transitions are fundamental changes in the culture, structure and routines of a regime (Haan 2010).

The regime's tendency to concentrate on internal alignment, incremental improvement based on historically built-up social and economic capital may hamper fluid adaptation to developments at micro-level or in the landscape in which the regime operates, including sustainability issues. It may effectively lock out innovations (be they ideas, technologies or processes) that have a poor fit to the current constellation and/or are not yet able to outperform current elements. Therefore these innovations are often first developed in micro-level niches with different routines, culture and structure, reproduced by different actors where they *do* have advantages (Levinthal 1998; Schot and Geels 2005).

Authors like Geels, Schot and Kemp (Geels and Kemp 2000; Geels 2004; Geels 2005; Schot and Geels 2007) have described and studied historical, socio-technical transition. They show how transitions result from an interplay between processes at many timescales and levels of abstraction and even small changes may ultimately have large effects on the regimes we have in a society. Transition studies therefore treat society as a complex system. The dynamics in such

a system may be explained by key patterns and processes. According to Holling who studied socio-ecological systems (the ecosystem management approaches based on his line of thinking have many similarities with transition studies (Van der Brugge and Van Raak 2007)), complexity of systems does not emerge from a "*random association of a large number of interacting factors, rather from a smaller number of controlling processes"* (Holling 2001). A key effort in transition studies is to identify and describe such processes and patterns so that change agents (policy makers, entrepreneurs or otherwise) can use this information to stimulate sustainability transitions more effectively.

Historical research and insights from fields like complexity theory show regularities in transition processes in the form of typical patterns of change. These studies however also show that the dynamics and direction of societal change are to a large extent unknown before and even while they happen. Small interventions may tip the balance and send the system towards a new equilibrium, while large interventions may simply be absorbed by the system. Transitions dynamics cannot be controlled, but they are influenced.

Before continuing to discuss the type of problems and governance approaches that are suggested for transition dynamics, first some caution about complexity. Complexity is a recurring feature of studies about transition dynamics and efforts to influence them. This complexity easily becomes a trap for transition monitoring. Complexity means that social systems are composed of many parts or different kinds of parts which are interrelated in a complex way. Among practitioners and scholars there may be a particular tendency to use complexity as an argument to advocate that more people and things should be included in monitoring, evaluation and programme management. This may become highly problematic for monitoring and evaluation.

This tendency may be found in different fields relevant to transition monitoring like innovation studies, governance studies and evaluation studies. For instance, according to Geels' review of science and technology studies (STS) (2007), the studies used complexity to criticize reductionist, simplistic, linear thinking. These STS studies rightfully drew attention to the holistic nature, messiness and unpredictable nature of change and resulted in a call for more reflexivity, including more variables and involving a larger number of stakeholders. This was certainly relevant as a counterbalance to overly linear and reductionist policies and thinking, but suffers from "*diminishing returns*" when policy makers well realize the complexity of the situation. Eventually a continued call for more inclusiveness may be detrimental to both the programme and to meaningful ways to monitor and evaluate them.

According to Geels (2007), gaining a better scientific understanding and providing more practical policy advice requires looking at more specific patterns and regularities, referred to as middle range theories. He argues that using pattern-based middle range theories *"… accepts and cherishes the importance of complexity, messiness and local practices, but maintains that (inter)actions in many local practices can add up to patterns and regularities at a global level. The task of middle range theory is thus to stylize and simplify complexity*" (Geels 2007). Middle range theories (as coined by Merton) meaning theories that are neither all-encompassing 'grand' theories, nor overly specific and nitty-gritty but rather specific theories for a relevant class of phenomena.

Recent transition studies have identified such middle-range theories in terms of typical dynamical patterns on topics ranging from individual experiments (Van den Bosch 2010) to long-term regime change (Geels and Schot 2007; Haan 2010). Rather than monitoring everything, transition monitoring should be an instrument that takes advantage of these theories to make complexity manageable and understandable for specific programmes. Similarly, the transition

monitoring approach presents (steps toward) a middle-range theory on programmes and monitoring and evaluation: a specific type of monitoring for a specific type of programmes.

1.2 SUSTAINABILITY TRANSITIONS AS UNSTRUCTURED PROBLEMS

Sustainability issues require transitions, but such fundamental changes of current regimes present society with a problem. This problem is unstructured, because there is no consensus on both the result of a transition process, (for example what type of energy system is the most sustainable and feasible) and the ways to influence this process. This type of problem, also referred to as complex, or wicked (Rittel and Webber 1973), has no straightforward solution because consensus about the norms and values at stake and certainty about relevant knowledge to solve the problem cannot be assumed (Hisschemöller 1993) and will change over time. Hisschemöller, Hoppe and Dunn (2001) describe these problems from a knowledge perspective as follows: "*The boundaries of the problem are diffuse so they can hardly be separated from other problems. To address the whole problem is more than to address each of its parts. One cannot be sure what disciplines and specializations are to be invoked for problem solving. Conflicting values and facts are interwoven and many actors become involved in the policy process*." (p.49) Sustainability problems are also described as persistent problems because they exist for extended periods of time and require interventions by different actors that all have limited influence, little room to manoeuvre, a short term horizon and interests in the current system (Rotmans 2005).

Traditional planning requires a clear goal formulated before action and problem solving through a clearly defined sequence of actions. The failure to address unstructured problems through traditional planning has been long since recognized. Meadowcroft (1997) provides an overview of criticisms of traditional planning by Hayek, Lindblom and others. For one, in a society where many different public, private and not-for-profit interest groups shape policy and social change and have different interests and values, there is simply no way forward or plan on which everybody agrees, neither is there an actor to single-handedly implement such a plan. According to Lindblom there is no other way forward than through partisan mutual adjustment and incremental changes (Lindblom 1979). This is not a plea for conservatism or an attempt to downplay the urgency of many unstructured problems. We should want a transition because sustainability problems urge us to. It just points us to the fact that a choice to instantaneously implement large-scale, fundamental change is not possible, and that if it was, it may not have the intended effect. Transitions will only result from a large number of smaller changes and a fluid, continuous decision making process in which many interrelated interventions with expected but also often unexpected outcomes and other changes will add up to a large change. Three elements seem especially important for attempts to deal with an unstructured problem: (1) uncertainty which requires learning, (2) interrelatedness, requiring coordination and (3) the dynamic interplay between learning and intervention requiring a continuous process of learning, intervention and coordination.

In unstructured problems there is uncertainty about what the problem and solution is and what strategy is needed to solve the problem. This uncertainty is manifold. Walker et al. for instance distinguish between uncertainty due to variability and uncertainty due to limited knowledge (Walker et al. 2001). Uncertainty due to variability include results from different values of stakeholders, outcomes that are influenced by small initial differences, technological surprise,

etc. Uncertainty due to knowledge can be positioned on an axis between uncertainties that can be reduced in a straightforward manner like a lack of exact information on the reliability of some new technology, to irreducible ignorance, for instance about what the world will look like in 50 years. With regard to innovations, Meijer et al identify six sources of uncertainty for entrepreneurs: technological uncertainty, resources uncertainty, competitive uncertainty, supplier uncertainty, consumer uncertainty and political uncertainty (Meijer 2007). Hisschemöller therefore argues that policy-making on problems that are perceived as unstructured, should be approached as a learning process and not as traditional planning, negotiating or pacifying (Hisschemöller 1993).

Change efforts are highly interrelated in unstructured problems. This interrelatedness means there is need for coordination between actors and interventions on both a short-term, local level, to a global, long-term level. For example, the uncertainties for an entrepreneur are in part uncertainties about the behavior of other actors like suppliers, consumers and political actors. Since the 1990s, cross-organizational networks are put on the agenda as a promising governance arrangement because of their ability to develop more integral and holistic approaches, speed up learning processes in more flexible and adaptive institutional set-up and create synergies (O'Toole Jr 1997; Mandell and Steelman 2003). Transitions require multiple innovations that reinforce each other. With regard to types of interventions, insights from science and technology studies show that realizing innovations requires more individual innovations (artefacts, processes, ideas). It needs to address failures in the systems in which innovations are realized (see for example Smits and Kuhlmann 2004). Examples include poor alignment between the activities of different actors, lack of resources, addressing institutional barriers, poor networks, guidance of the search etc. Also transition management as described by people like Kemp, Rotmans, Loorbach and others (Rotmans and Kemp 2001; Loorbach 2007; Loorbach 2010) proposes a portfolio of widely different interventions that need to be aligned in order to influence transition dynamics (see next section).

Each intervention and on-going social change offer opportunities to learn more about relevant problems/goals and solutions. A third, crucial aspect of dealing with unstructured problems is that problem definition and interventions are two sides of the same coin and change over time. Any definition of a problem can only take a subset of the situation into account. How the challenge is defined strongly influences the solutions that are put forward and "*each attempt at creating a solution changes the understanding of the problem*" (Rittel and Webber 1973). The effort to transfer, receive and integrate knowledge for this learning process within a transition programme will therefore be an on-going effort as the unstructured problem takes on different dimensions and participants in the programme change (Weber and Khademian 2008). This is captured by March and Olson's statement that "*change develops meaning through the process by which it occurs*" (March en Olson, 1989, in Schön and Rein 1994, p. 170). Dealing with unstructured problems requires parallel learning and intervention, also referred to as a process of searching (getting ideas about potentially relevant problems, goals and solutions), experimenting (intervening in social systems) and learning (comparing the problems/goals/solutions to real life effects and dynamics).

1.3 TRANSITION PROGRAMMES

Programmes may offer the necessary coordination. Programmes can realize benefits that individual actors and activities can not realize, for example by pooling and distributing resources and forming a link to larger players and developments. They can be temporary or semi-permanent, highly institutionalized or not, large or small etc. The term 'programme' is often used loosely. Programmes are described from a policy perspective as a strategic instrument to implement policies and from a project management perspective as large projects or frameworks to coordinate different projects. More and more, programmes and projects are seen as distinct activities and identities (see table 1.1).

Table 1.1 Distinctive characteristics of programs and projects according to Artto et al. (Artto, Martinsuo et al. 2009)

	Characteristic for programmes	***Characteristic for projects***
Theme	Several themes of management and organization science. Major changes in industry and society introduce contemporary themes that programs are expected to address like industrial, economic and institutional change	Product development
Object	Change of the programme context like an organization or sector	Narrowly defined task entity or organizational entity that is temporary. Context is taken as given, serving as an influence factor of project success
System	Systems thinking	No systems thinking
Types of innovation	Various types of innovations that reflect an open system nature of organizations in their environments. For example, process innovation, organizational innovation and change, infrastructure and systems innovation	Product innovation
Types of outcome	Wide set of impacts. Broader, fuzzier and more indirect and far-reaching effects with long-term implications in the future	Concrete business results. Direct results that contribute in a foreseeable manner to business success. Focus is on short-term outputs (project or product success)

Transition monitoring is part of Transition management (TM) (Rotmans, Kemp et al. 2001; Smith, Stirling et al. 2005; Loorbach 2007). TM combines insights in transition dynamics with sociology, governance literature and network management to develop a governance approach to influence transition dynamics. Loorbach (2007) identifies four types of activities in TM: strategic, tactical, operational and reflexive. Strategic activities are processes of vision development, problem framing and strategic discussions directed at the long-term and focusing on aggregated levels like a sector, region or country. Think of broad-scoped discussions on the problems within current energy systems and the societal challenge that lies ahead to solve these. Tactical activities create room for change within the dominant structures of a societal (sub-) system. This level includes support structures like innovation programmes, adaptations to the financial, regulatory and institutional infrastructure, network building and agenda-setting. Operational activities are innovative, local transition experiments. Monitoring belongs to the reflexive activities just like assessments and evaluation. These reflexive activities concern the other three types of activities and the on-going transition dynamics. Based on these transition management ideas, monitoring transition programmes requires monitoring the strategic, tactical and

operational activities. It should not only look at these activities separately, but also –and importantly- focus on their interaction.

Rotmans, Kemp et al. (2001) and Loorbach (2007) have further developed the descriptive transition management framework into operational guidelines with an emphasis on strategic activities. Recently different studies were conducted to further test and work out different elements of transition management like transition scenarios (Sondeijker, Geurts et al. 2006; Sondeijker 2009) and transition experiments (Van den Bosch and Taanman 2006; Van den Bosch 2010). Transition management requires coordination between strategic, tactical, operational and reflexive activities. A transition programme can be regarded as a coordinated portfolio of operational, tactical, strategic and reflexive transition management activities.

In transition programmes realizing alternatives by engaging in transition processes and developing goals and strategies go hand in hand. Developing goals and strategies is not a precondition for interventions, after which change follows, but is part and parcel to the change process itself and programmes continuously seek and investigate the meaning of problems, solutions and strategies.

Transition programmes *are temporary institutions that purposively group together and coordinate different change actions and change agents to stimulate a sustainability transition through a process of searching, experimenting and learning.*

It may be argued that the "*programme as an entity is nothing more than the product of the activity of programme management" (Gray 1997, p5)*. Pellegrinelli et al (2007) show through case studies that programme management is characterized by the "*significant and on-going crafting of programme content, structures and processes to reconcile divergent aims and interests, to expedite progress in the face of adversity and to engage multiple sponsors, contributors and stakeholders"* (Pellegrinelli 2007).

The need to coordinate different TM activities and change agents is a central characteristic of transition management. Programmes coordinate individual activities with respect to content, process and integration (Buuren, Buijs et al. 2010). According to Buuren et al. (2010, p676) "*programme management in practice is often a hybrid of a top–down implemented management tool and an emerging management strategy that gets its meaning from the strategies and interventions of a variety of participating actors from the projects and program organizations*. *Context is crucial to understanding the form of program management that ultimately results*".

1.4 TRANSITION MONITORING

Transition management implies "*not one moment of intervention, following which managers stand back and await the desired result, but a constant, continual dynamic in which further adjustments are required as environmental conditions change, these changes being, in part, the outcome of previous interventions*" (Shove and Walker 2007). This requires what Giddens calls reflexive monitoring. Reflexive monitoring is the human capacity to routinely observe and understand what you are doing while you are doing it. Programme managers monitor the flow of their activities based on an understanding of themselves and others. They are also able to monitor their monitoring. Thus reflexive monitoring includes the continuous monitoring of activities within their context, as well as the continuous adjustment of one's actions

and action frame (Giddens, 1984 in Sarason, Dean et al. 2006). In analogy to Schön and Rein's definition of policy action frames (1994), a change agent's action frame is the frame an agent uses to construct the transition challenge of a specific situation, i.e. what is to be changed, why and how. Monitoring may result in first order learning (learning without changing action frames) and/or second order learning, (in which the original action frames are altered).

Central to the ideas of Schön and Rein is that learning is not disconnected, or abstracted from action, but situated in action as professionals practically learn about situations and become able to question what they had previously understood. These reflexive processes are especially important for programmes that are probing different transitions. Probing (trying out and testing alternatives to the current functioning) is "*impaired by any restriction of the free play of ideas, whether by unreflective reliance on convergent views that results from a common experience of socialization, or by the domination of […] the ranks of the elite*" (Schön and Rein 1994 on Lindblom, 1995, p. 53). Taken for granted ideas about how things work (acquired in processes of socialization), may block innovative strategies but –being deeply ingrained in our minds- are difficult to identify and critically analyse (Grin, Felix et al. 2004). Note that monitoring up to this point is a largely automatic process that is part of any human action. In this study we develop an instrument to make this process more explicit, systematic and transition oriented.

Such a reflexive monitoring instrument is part of on-going planning, acting and evaluation and readjustment. Most monitoring approaches are rooted in management approaches that assume that you have to plan before you can act and act before you can monitor whether everything goes according to plan. In such management approaches, planning, acting and monitoring are carried out consecutively and by different people. These monitoring approaches are therefore not suitable to stimulate reflexivity or learning-in-action. Most reflexive methods on the other hand tend to be too distanced from on-going action to provide continuous, structured feedback on what is happening: they are not used for monitoring. The challenge is therefore to develop an approach for reflexive monitoring.

Monitoring can be used in many different ways and for many different purposes (Engbersen and Van der Pennen 1997; Behn 2003) leading Boyle (1998) to provocatively call out "the question to ask is why *not* monitor?". Different purposes require different types of information and have different target groups. If the purpose of TMon goes beyond descriptive monitoring (like signalling) three uses can be identified. These have different users and inform different types of action.

- *Programme development.* Monitoring is put to developmental use. It results in recommendations and reflection by programme managers to intervene in on-going programmes.
- *Programme accountability.* Monitoring is used to collect information on the programmes to be used by people other than programme managers like funders or legislators to pass formative or summative judgement on the merits of the programme.
- *Programme communication.* Monitoring is used to transfer lessons to third parties. Actors not involved in an intervention can use the lessons and experiences gained in a transition (management) process to set up or improve similar interventions.

Apart from these three instrumental uses, there may also be non-instrumental use of monitoring. Non-instrumental uses include political use (using the monitoring findings to back up previously taken positions), symbolic use (transition

monitoring to signal how professional a change agent is) and indirect use ('enlightenment' through the gradual build-up of knowledge) (Weiss 1998; De Kool 2007). The key to good transition programmes is good programme development and a good understanding of this development is a precondition for appropriate accountability and communication. Therefore TMon is designed for developmental purposes.

Transition monitoring *is a process to systematically and continuously collect information and reflect on on-going developments for programme development*.

1.5 THEORETICAL RELEVANCE

Research and design of a transition monitoring approach adds on and draws from research in transition studies, programme management and programme monitoring and evaluation.

TRANSITION STUDIES

Transition studies and management offer a distinct perspective on the governance for sustainability. In the early development of transition studies insights from integrated assessment, sustainability studies and science and technology studies on historical transition dynamics have been used for policy advice (Geels and Kemp 2000; Rotmans, Kemp et al. 2001; Hoogma 2002) and these were adopted in Dutch national policy for the fourth national environmental plan (VROM 2001). The long-term strategic scope of this white paper matched the quite general and long-term insights into transition dynamics. The interplay between descriptive research, prescriptive research and policy has continued since then and is characteristic for transition management and subject to acclaim (Loorbach 2007) and critique (Duineveld, Beunen et al. 2007). Since 2001 change agents have to varying degrees sought to implement ideas from transition studies, which raised questions on how to 'do' transition management and a shifting focus from the long term to the short term, while, simultaneously, research on transition dynamics and management has developed clearer, more detailed and specific theories. Monitoring is a way to match these more specific management questions and transition theories. This fits in the larger tradition of science-policy interaction and co-production that characterizes transition (management) studies. Monitoring how transition programmes work, and what its effects are provides information that can be used to improve transition management both in theory and practice. From a research perspective, theory-based monitoring is a next step in the empirical application of transition theories which is necessary for the field as a whole to become more explanatory instead of conceptual (Genus and Coles 2008; Holtz, Brugnach et al. 2008; Konrad, Truffer et al. 2008). Additionally, systematic monitoring and evaluation makes doing transition management more transparent. Such transparency is necessary to study in what way transition management is actually innovative, reflexive and legitimate (Grin, Felix et al. 2004; Voss, Bauknecht et al. 2006; Rotmans and Kemp 2008; Shove and Walker 2008). Shove and Walker (2007, 2008) for example criticize transition management for not being clear what should be monitored and when and how this is to result in changes in on-going transition management. Their primary concern here is not instrumental, but political. The knowledge presented by ambitious, value-laden and complex endeavours like transition management cannot be viewed separately from the values and interests of the stakeholders involved. Monitoring is therefore inevitably caught up in the politics of definition that come into play (Shove and Walker 2008). For example what transition are we talking about? Whose desired change is this? Why this one? What is meant with sustainability? By whom is it defined? Concerning what system and values? Who develops steering suggestions? Based on whose problem statement? To what effect?

PROGRAMME MANAGEMENT

Many characteristics of transition programmes (like diverse networks and portfolios, the aim to influence fundamental and long term change in complex systems towards a normative goal) are similar to programmes in fields like innovation (Molas-Gallart and Davies 2006), development aid (Carlsson and Engel 2002; Davies 2004; Davies 2005), and ecosystem management (Folke, Hahn et al. 2005), etc. These programmes are confronted with similar management, monitoring and evaluation issues.

Improving transition programmes requires understanding how 'good' transition programmes are to work and what role programme managers play. In a literature review Artto et al. (2009) identify six themes neglected in programme management. Of particular relevance to this study are: neglect of inter-project coordination, neglect of inter-organizational issues and theories, limited inclusion of the effect of uncertainty, complexity and novelty on relevant types of programme management and a lack of context-specific views of programme management (Artto, Martinsuo et al. 2009)[2]. These issues play a key role in transition programmes: different (ie strategic, tactical, operational and reflective) activities are expected to reinforce each other, they are carried out by networks with different stakeholders, are based on a complexity-based view of change and management, and are responsive to on-going dynamics in the programme context.

Although networks have been studied from a variety of perspectives, according to Provan and Kenis (Provan and Kenis 2008), too little attention is paid to networks as a form of governance (as opposed to network analysis). Van Aken and Weggeman (2000) warn that change agents who manage networks are confronted with a dilemma: too little management effort may lead to under-exploitation of the potential, but too much management may destroy the informal nature and disrupt the trust basis and thus their creative and explorative potential. From a radical change point of view, the large number of variables and evolutionary nature of the scope of projects and the programme as a whole makes it difficult to apply conventional project management (Levene and Braganza 1996). This means that a more adaptive and learning approach to management is required, to which until recently little attention has been paid. What is also frequently neglected in theories on programme management, is the interaction between a programme and the environment it aims to change (Pellegrinelli 2002). Advice to improve transition programmes needs to be based on an understanding how such programmes and their managers work. Developing such an understanding is a prerequisite for transition monitoring and as such the design of a TMon approach is of relevance to programme management.

MONITORING AND EVALUATION

Programmes with a complexity-based view of change, long-term aims, an integrated approach and joined-up action cannot be evaluated in the same manner as simple programmes (Sanderson 2000). Monitoring and evaluation (M&E) theorists are looking for ways to monitor and evaluate them in a way that is simple, but not too simple (Davies 2004). Nevertheless, the question remains whether such a programme is not too complex: "*too difficult to explain its key*

[2] The other neglected areas are reference to classical project management studies from the 1980s, and neglect of the interplay between the permanent and temporary (eg programme or project) organization.

objectives in tangible terms, too amorphous to deliver, and [therefore] *too difficult to meaningfully evaluate*" (Pinnegar 2006).

Research in the field of evaluation studies provides several starting points. Improving a programme requires understanding why a programme leads to certain effects. Monitoring which addresses solely inputs and outputs and evaluation solely addressing outcomes/impacts, are insufficient to support learning and continuous development in programmes. For that, programme managers need to know why certain outcomes are achieved. A theory is needed to describe how inputs, processes, outputs, outcomes and impacts are connected in a particular context (eg Pawson and Tilley 1997; Stame 2004; van der Knaap 2004).When programmes are understood as learning networks, they will change over time and so will their theories. Improving programmes includes learning about these theories. When programme managers are involved in the M&E process, this enhances the learning potential (Patton 1986). For the evaluator this means "*away from an objective model of evaluation, in which independent evaluators produce evidence but no recommendations, and toward a model involving evaluators in learning exercises with all stakeholders and providing advice and recommendations as well as independent analysis. In this formative context, the evaluator becomes a facilitator rather than an external expert. The result would be a more flexible and experimental approach to policy formulation*." (Kuhlmann in Molas-Gallart and Davies 2006). This gives evaluation a role in the on-going development of programmes (Patton 1994) and monitoring a role in the on-going evaluation of a programme. Traditional boundaries between monitoring theories and methods (as routine data collection on on-going developments) and evaluation (as ex post or ex ante assessment of the programmes effects) start to blur. A flexible process of searching, learning and probing means that there may not yet be a detailed programme theory, which does not fit well with most planning, monitoring and evaluation approaches.

1.6 AIM AND RESEARCH QUESTIONS

Summarizing the preceding sections, this research aims to design a monitoring approach that is useful for programme managers that want to contribute to a sustainability transition with their programme. This approach should stimulate continuous programme development and improvement. The research is based on the following starting points:

- Realizing a sustainability transition is an unstructured problem,
- This requires a continuous process of searching, experimenting and learning, which means that programmes are continuously developing
- Transition monitoring may help inform and support programme development by providing feedback on current developments in and outside the programme.
- Strategies, interests and contexts of different transition programmes and their managers differ widely, leading to different monitoring needs. Developing transition monitoring therefore requires interaction with programme management.
- The theoretical basis of transition monitoring is programme management, monitoring and evaluation and theories on transition dynamics and transition management.

To my knowledge, there are no examples of monitoring approaches that fit these starting points. Nor are there detailed methodologies for transition monitoring. This thesis therefore sets out to develop transition monitoring applications in

practice and evaluate these in order to design a generic approach to transition monitoring. The research questions follow the three steps of this design process (see also chapter 2):

1. What are key challenges that should be addressed in the design of a transition monitoring approach?

This question is the most explorative. Identified challenges set the agenda for the theoretical framework and the design of a transition monitoring approach.

2. How can these be translated into a monitoring approach?

This question addresses the primary design step. It is based on the answers of question 1.

3. What can we learn about this monitoring approach through its application in different cases?

This last question explores specific characteristics of the developed monitoring approach. What are the possibilities and limitations of this monitoring approach with respect to (a) multi-level monitoring, (b) application to different programme strategies, (c) regular redesign of monitoring activities and (d) different modes of monitoring?

1.7 OUTLINE

This dissertation is structured as follows. The next chapter describes the methodology of this thesis. This methodology consists of three steps. The first step is the conduction and evaluation of five pilots for transition monitoring. This is described in chapter 3. These pilots result in key challenges for TMon and addresses research question 1. Chapter 4 offers a theoretical exploration of these challenges, resulting in various theoretical building blocks for the TMon approach. This approach is described in chapter 5. Chapters 4 and 5 present the second step in the design process and address research question 2. The third step consists of an additional five case studies, each described in a different chapter. Chapter 6 describes the monitoring of different projects in a programme on healthcare. Chapter 7 monitors the dynamics in the larger transition field in which platform new gas operates. Chapter 8 focuses on a series of monitoring activities to support the development of a vision in a programme on sustainable agriculture. For the Innovation Agenda Energy (chapter 9) a monitoring design was developed for a range of comparable innovation programmes. Chapter 10 describes various monitoring activities developed and conducted for a regional climate change programme. Chapters 6-10 addresses the third research question. The answers to the research questions are presented in chapter 11, as well as some general issues for discussion and potentially interesting directions for further research.

CHAPTER 2 METHODOLOGY

Developing a transition monitoring approach is a design process. This chapter describes the design methodology. First, design research is introduced and a general research framework for design research presented in section 2.1. Two topics in the design process require additional explanation. The TMon design is the result of a process of co-production between transition experts and programme managers. Section 2.2 describes why co-production was chosen. In section 2.3 the different cases and steps are described that lead to the generic TMon approach. Each case describes the design and implementation of transition monitoring in a specific programme.

2.1 RESEARCH DESIGN AND DESIGN RESEARCH

This research is about the design of a monitoring approach for programmes that aim to stimulate a sustainability transition. Characteristic for design research (including for example management studies), is that it produces rules, heuristics or chunks of general knowledge, linking an intervention to a desired outcome in a certain field of application (Van Aken, 2004). In this study this means producing heuristics for transition monitoring in different transition programmes.

Hevner, March et al (2004) propose a research framework for the design of information systems for businesses. Their framework offers a starting point for the research methodology. Figure 2.1 shows their framework, adapted for transition monitoring. This framework consists of three interacting elements from left to right: the programme in which transition monitoring is used, the design of the TMon approach and the social science foundations for this approach.

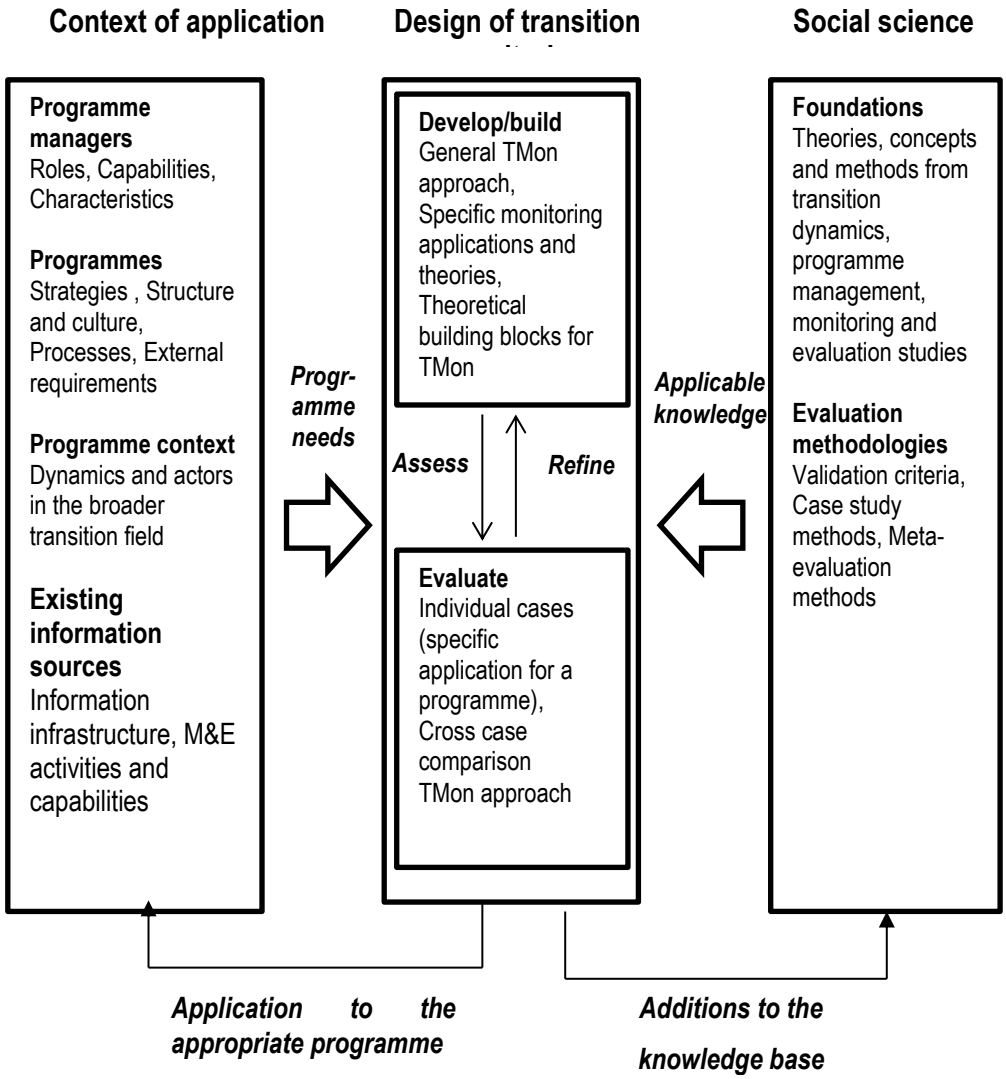

Figure 2.1: Research framework for the design of the transition monitoring approach (Adapted from Hevner, et al 2004)

Starting from the left, the programme is the context of application for transition monitoring. This programme defines the needs for particular monitoring activities. These needs consist of goals, tasks, problems and opportunities (not depicted) for monitoring as perceived by the programme managers and experts who are responsible for the monitoring. The needs of a programme manager, the primary user of transition monitoring, are shaped by his or her roles, capabilities and characteristics. Monitoring needs are assessed and evaluated with respect to the programme characteristics like the programme strategy, structure and culture, existing processes and external requirements by programme commissioners or others. The monitoring not only focuses on programme internal developments, but also on the programme context: the social system in which the programme wants to stimulate a sustainability transition and the individual projects and other activities associated with the programme. Monitoring applications are positioned relative to other, formal and informal information flows within the programme, including existing monitoring and evaluation activities and capabilities.

Given a certain programme need for monitoring, the design of transition monitoring (central column) is an iterative process. According to Hevner et al "*knowledge and understanding of a design problem and its solution are acquired in the building and application of an artifact*" (2004, p. 82), the artifact in this case being a monitoring approach. Design is

both a process and an artifact. The general transition monitoring approach results from -and in- different programme-specific monitoring applications. Evaluation of each application can lead to refinement of the design process and of transition monitoring both on the level of the applied monitoring activities and the overall approach. The design not only concerns the development of a management tool but also the development of theoretical building blocks related to the monitoring needs of transition programmes. These building blocks help understand and address what monitoring information and processes are needed. Together with the management tool, they are evaluated both with respect to the monitoring needs (are the building blocks useful in practice) and existing social science literature (are they theoretically robust).

The social science foundations of the monitoring approach consist of existing literature on programme management, transition dynamics and management and monitoring and evaluation. This literature consists of concepts, theories, concrete empirical studies and methods that are used in the build/develop phase of the monitoring approach. Evaluation methodologies are needed to evaluate a particular monitoring design. These methodologies include (meta-) evaluation methods, validation criteria and case study methods. Next to the theory needed for the general approach, specific applications of transition monitoring may require additional theoretical and methodological foundation like specific theories on transition patterns (De Haan, 2010), innovation systems analysis (Hekkerts, Suurs et al, 2007), etc. These theories are not part of the general monitoring approach but are however helpful to address particular monitoring needs and are used as a theoretical background for individual applications.

Two elaborations of this research design are discussed in the following sections. The first concerns the position of the researcher. Designing the monitoring approach took place in a process of co-production between programme managers, the author of this dissertation and other transition and monitoring experts external to the programme . Second, the design process itself, based on ten cases and different steps is described.

2.2 DESIGN THROUGH CO-PRODUCTION

There are three reasons to develop the monitoring approach in a process of co-production: instrumental, substantial and legitimacy-related. Instrumentally, intensive involvement of programme managers may enhance the practical use of the developed monitoring. Substantively, involvement of the knowledge of programme managers may improve the quality of the monitoring and them having a say in the monitoring may improve the legitimacy of monitoring applications. These reasons are closely related to the complex problems programme managers aim to solve.

The first reason relates to the instrumental use of monitoring. The transition monitoring approach in this study has been co-produced by monitoring/transition experts and programme stakeholders to enhance its usefulness in practice. Scientists in management science, policy science and evaluation are often dissatisfied by the instrumental use of their research findings in practice (Lindblom and Cohen 1979; Joan E. van Aken 2004). The chance that the results of TMon will be used by programme managers increases when programme managers are involved in the entire monitoring process and can decide what is most important. This means transition monitoring is developed for the *intended use by intended users* (Patton 1986). The target group for transition monitoring are programme managers who want to further develop their programmes. As noted earlier, the (perceived) monitoring needs of a programme are shaped by the roles, capacities and characteristics of programme managers. It is therefore important to involve these managers in the

monitoring process. In addition, the value of monitoring not only lies in the outputs (the collected information) and outcomes (the resulting recommendations for programme development and reflection by programme managers), but also –and importantly- in the process of monitoring. The process of designing a monitoring application, collecting and analyzing the information is also a valuable learning process, that can benefit programme managers and experts alike. Collective learning is commonly considered to result from more participatory monitoring and evaluation (Guijt 2008).Participatory in this case means participation of programme managers in the monitoring process. These collective learning processes are especially important when dealing with complex problems.

Secondly, co-production helps to include the in depth knowledge of programme managers about their programme and the context they operate in. Next to the pragmatic attractiveness to therefore include them in the monitoring process –in itself a sufficient reason- there is also some deeper meaning to this. Monitoring for programme development depends on asking questions like "Where are we going?" "Is this development desirable?" , "What if anything should we do about it?" "Who gains and who loses, and by which mechanism of power?". Answering these questions requires a value judgment of what is the right type of intervention in a particular situation. It requires 'practical wisdom', referred to as phronesis: the specific type of personal knowledge of how to manage for example a programme in each particular circumstance that can never be equated with or reduced to knowledge of general truths about managing (Flyvbjerg 2006). With more explicit reference to evaluation literature, also Sanderson (2004) argues that "*formal research and evaluation evidence may well provide guidance on 'what is likely to work' but this will need to be assimilated with practice wisdom in coming to decisions on policies or actions that are appropriate in particular circumstances, taking into account relevant ethical-moral considerations*." (Sanderson, 2004, p.371). In a similar line of reasoning based on structuration theory applied to entrepreneurship, Sarason, Dean et al (2006) describe that opportunities are not 'out there' but are idiosyncratic to an entrepreneur (in our case a pro-active programme manager). This means that the perceived opportunities of monitoring information for programme development depend on the perception of a programme manager through his or her unique, situated perspective, rooted in extensive experience with the programme. Intensive involvement of programme managers thus adds practical wisdom to the process alongside the theoretical and technical wisdom that can be expected from transition and monitoring experts. Inclusion of different types of knowledge in co-producing monitoring activities leads to the identification and discussion of different knowledge claims and perspectives. Apart from the important process results mentioned in the previous paragraph, this can also lead to better informed and therefore qualitatively superior monitoring activities.

A final reason to engage in co-production is the legitimacy of the approach. Defining a sustainability transition and how to stimulate it, depends on individual framings of the situation that cannot be dealt with analytically from a distance (Schön and Rein 1994). The values and high stakes combined with the uncertainties associated with sustainability and transitions imply that quality assessment should go beyond peer-review of experts. Experts not involved in the programme and monitoring design cannot sufficiently address the value implications in practice and deal with the inherent uncertainties. Legitimating the monitoring approach should therefore include the judgment of the different stakeholders (Funtowicz and Ravetz 1993). Apart from this more technical rationale, there is also a normative imperative. Those who experience the consequences of the monitoring design have the right to pass judgment on it. In this case the primary stakeholders are the program managers who most directly experience the effects of transition

monitoring. Apart from positive experiences (learning from interaction with transition experts, helping to make sense of and improve programme development), these also include negative experiences (resource consuming, raising critical questions on programme functioning by outside experts with different values and interests). Programme managers therefore have a right to be included in decisions about what is to be monitored, how and to which effect.

This account on co-production so far has been one-sided on why *programme managers* should be involved in transition monitoring. Also the active involvement of the transition experts who are external to the programme can be argued to be beneficial for transition monitoring. Apart from the fact that I operated as a researcher who was usually seen by programme managers as external, there are also other reasons. First is the presumption that the current body of transition research can be of direct benefit to programme managers. Although not the primary aim of this research, the monitoring activities explore the usefulness of a range of transition management and transition dynamics concepts and theories in practice. Outsiders bring more than technical and theoretical expertise into the monitoring process. As explained by Grin (Grin, Rotmans et al 2009) and based on Stones (Stones 2005), reflexive monitoring requires an intimate understanding of the action frame of the programme manager but also some critical distance. From such a distance it may be possible to highlight conditions that the manager assumes he cannot influence, but that in reality *can* be influenced or at least negotiated. Secondly, in attempts to respond to these conditions with other actors, the programme manager needs to understand the frames, powers, capacities and roles other actors feel they play. This is a tall order for any individual and outsiders may help programme managers to do this.

Another issue is my personal role as participant in the co-production process. Concerns may be that as a participant I may not give an objective account of what happened in the various monitoring designs and that monitoring results do not paint an objective image of the programme. And indeed, I did have a personal stake in the monitoring design: to produce a new monitoring approach for programmes aiming for a transition, using transition theories. This may have led to a blind spot for reasons *not* to monitor, for using conventional monitoring approaches, for reasons not to use transition theories or not to pursue a fundamental, long term sustainability transition as a programme. These arguments need to be weighed against the arguments for co-production and were partially remedied.

One way is –paradoxically- by engaging in co-production. In a process of co-production conflicting viewpoints between transition experts and programme managers can (and have) become articulated in an early stage. This was the case in some of the case studies and these conflicts are described where they occurred (see chapters 3, 7, 9 and 10). Also conflicting arguments from social science literature will be discussed. Next, I had different levels of involvement in different case studies (see later). As a result, potential biases in my evaluation as a result of my level of involvement may become apparent to the reader by comparing descriptions and conclusions of cases in which I played a large with those in which I played a smaller role. Thirdly, I have presented the design process and the choices in this process as transparently as possible. I triangulated the findings by interviews and chapter reviews by involved programme managers and of descriptions by augmenting field notes with additional data collection through interviews and questionnaires. Reflection on the co-production process itself has become part of the design (see for example section 3.5 and section 4.4). As a side note, co-production also forms the basis of many other transition management studies (see for instance Kemp and Rotmans, 2009, Loorbach, 2007, Van den Bosch, 2010).

2.3 THE DESIGN PROCESS AS A DEVELOPING MULTIPLE-CASE STUDY

The transition monitoring design is developed, applied and tested in on-going transition programmes. Design of the monitoring approach requires intimate knowledge of how and why transition monitoring design takes place in practice. According to Van Aken, a developing multiple-case study is a relevant research methodology for design. In the developing multiple-case study "*the [*rules*] are developed and tested by the researcher(s) in close cooperation with the people in the field [*and*] tested in the context of application. Such research is initiated by the researcher(s) interested in developing [*rules*] for a certain type of managerial issue. Each individual case is primarily oriented at solving the local problem in close collaboration with the local people, but, following the reflective cycle, after each case the researcher develops knowledge that can be transferred to similar contexts on the basis of reflection and cross-case analysis*." (Van Aken 2004, p232). Transition monitoring in this thesis is therefore studied through different case studies. Case studies investigate a phenomenon (here: transition monitoring design) within its real-life context (here: the specific processes of design and implementation of transition monitoring in different programmes) (based on Yin 2003). Each case describes a unique monitoring process and design, with unique effects in a particular programme context. These cases are explorative and provide both input to the general TMon approach and offer illustrations of different aspects of this approach.

The design took place through applications in ten different cases over a period of five years. These cases ran in parallel and for several years, involving some thirty different experts and programme managers -each with their own preferred way of working, interests and knowledge- in nine different programmes[3]. As a result of this diversity, it was not always possible to feed back changes in the general monitoring approach and other lessons from other applications into the different monitoring applications. This is a consequence of the choice to develop the framework largely in practice (making it as grounded as possible) and through co-production processes involving different people (to make it as useful and legitimate as possible and based on diverse knowledge). Ex post, it is possible to provide a more structured account to make the design of TMon as transparent as possible and to study several aspects of this approach.

The TMon approach is developed in three steps, each addressing a research question. The first step is a multiple-case study of transition monitoring pilots. The second step is the development of theoretical building blocks (based on challenges identified in the first step), which are translated to a transition monitoring approach. The third step consists of a second set of case studies to illustrate and explore different aspects of this transition monitoring approach. The two sets of case studies have a different character. The multiple case study in step one seeks to identify key challenges for transition monitoring and is based on a preliminary and only roughly defined monitoring approach. The cases in the third step are based on a more worked out monitoring approach and explore specific aspects of this approach. This means that, although all cases are explorative and have the same unit of analysis (the design and implementation of monitoring activities in a particular programme), the analysis of the first set of cases is more inductively oriented and broadly explorative than the analysis of the second set. The three steps are described below.

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[3] *Monitoring activities in the programme TransForum constitute two separate cases. One case is part of the explorative multiple case study of chapter five and describes roughly the first year of monitoring TransForum. The following three years of monitoring are the subject of chapter 7.*

STEP 1: IDENTIFYING KEY CHALLENGES FOR THE TRANSITION MONITORING APPROACH

The first step focuses on the left side of the research framework in figure 2.1. It consists of five pilot cases to explore initial ideas about transition monitoring in practice and to identify key challenges to develop the TMon approach and its underlying theoretical building blocks. The five programmes in which TMon was piloted, operated under the same institutional arrangement (the BSIK arrangement) as the programme that funded this research. Under this arrangement cooperation between programmes was stimulated. This resulted in a shared interest to jointly explore the topic of transition monitoring and therefore provided unique access. Their 'pilot' status means that they were primarily instrumental to gain some empirical, first-hand experience with initial ideas about transition monitoring and to identify challenges for transition monitoring that needed theoretical elaboration. Therefore practical considerations were more important than theoretical considerations for case study selection at this stage of the research. To identify challenges for transition monitoring, a meta-evaluation was conducted.

The cases have various things in common: the programmes fell under the same institutional arrangement, the initial proposals for the monitoring activities were similar[4] and all monitoring activities had the same, external, project leader. I was responsible for the development of a shared monitoring approach through the experiences in the different cases. This step addresses address the first sub question: "What are key challenges that should be addressed in the design of a transition monitoring approach?". The pilot cases are:

- Case 1 Monitoring PSIB: PSIB, which stands for Process and System Innovation in Construction, is an innovation programme in the construction sector that pursues innovations to improve the coordination between different actors in the construction process. Monitoring activities included discussions of the preliminary monitoring design, a series of indicator designs to show transition dynamics in the construction sector, a survey of perceived problems and solutions in the construction sector and analysis of the programme's alignment to these problems and solutions.
- Case 2 Monitoring Transumo: Transumo aims to support a transition (tran) to sustainable (su) mobility (mo). Monitoring activities included the process of vision development and general reflection of the programme in light of transition management concepts and the monitoring framework. Another feature of this case is the relation between transition monitoring and other interventions by programme management to make the programme more transition-oriented.
- Case 3 Monitoring Living with Water: Living with water (Leven met Water) is an innovation programme to support more integrated and adaptive water management. Monitoring activities included a series of open interviews with project leaders to identify lessons for successful management concerning innovative water projects and the water transition at large. These interviews later led to focus groups to aggregate the individual insights to lessons for the programme and sector as a whole.
- Case 4 Monitoring RGI: RGI (space for geo-information) sought to improve the use of geo-information by developing new applications, a vision on the desired geo-information infrastructure in the Netherlands and addressing institutional barriers. Monitoring activities include a reflection on the programme from a transition

[4] *The joint effort to develop a transition monitoring framework which was called the 'pizza project' in which the monitoring activities in each programme presented different 'slices'.*

management perspective through interviews with programme stakeholders to inform further programme development.

- Case 5 Monitoring Transforum: Transforum is an innovation programme on sustainable agriculture. A transition researcher reflected on programme development based on transition management principles and the monitoring framework. Later monitoring activities in Transforum are the topic of a different case study (see later).

The goal of this first step is to *identify general challenges* that should be addressed in a theoretical underpinning of transition monitoring. Although the five programmes were similar in many respects, there were important differences between the programmes like the expectations of programme managers and whether the programme strategy was oriented towards bottom-up learning or based on a long-term transition scenario. Also the monitoring activities were quite diverse. They had a different focus, were conducted in different ways and had different effects. A realist meta-evaluation approach (Pawson and Tilley 1997) was used to investigate the relation between monitoring activities, their initial results and the context in which monitoring took place. A key characteristic of realist evaluation is that it pays specific attention to how context influences the way an intervention leads to particular outcomes. It is an evaluation of what works for whom and in which circumstances. This realist meta-evaluation is based on (1) interviews with programme managers at the start of the monitoring activities, (2) participant observation during the monitoring design and implementation, and (3) nine months after the monitoring activities started, another set of interviews, a survey and analysis of the developed documents.

The central proposition is that key challenges will emerge by analyzing this interplay between monitoring activities, context, outcomes and the intermediary mechanisms. For example, co-production was an important element of the initial monitoring design (and still is). In practice the interaction between managers and experts was in some cases more intensive than others. The extent to which this is a problem, appears to be related to the expectations that involved programme managers have of transition monitoring. These expectations influence whether co-production is seen as legitimate, ownership of the results and where and how the knowledge of programme managers and experts should be integrated in the monitoring process. This leads to the conclusion that the desired process of co-production in practice may vary in different contexts. As a result, later research focused on these co-production processes and resulted in the identification of four different modes of monitoring (step 2) which were further analyzed in a new set of cases (step 3).

STEP 2: DEVELOPING THEORETICAL BUILDING BLOCKS AND DESIGN OF THE TMON APPROACH

Based on the identified challenges, the second step focuses on the right side to produce a stronger theoretical basis on which a more refined approach is developed. This addresses the second sub question: How can these challenges be translated into a monitoring approach?

The meta-evaluation of the first step highlights five challenges for transition monitoring: (1) relating developments at different levels and dimensions, (2) dealing with different programme strategies, (3) adapting to changing monitoring needs, (4) accommodating different views of co-production and (5) evaluating the programme fit. For each of these five challenges a literature study was conducted to develop theoretical building blocks to address them. The different challenges meant that different (although related) fields of literature were relevant. Sources include literature on

transition processes and management, entrepreneurial strategies, development programme evaluation, science and technology studies, sustainability assessment and programme management. Based on these building blocks, different types of monitoring are compared based upon a typology regarding the complexity of the sought after change and the nature of the problem as perceived by a particular programme. The TMon approach itself, is a further specification of some of the original ideas on transition monitoring that informed the pilots, based on these building blocks.

STEP 3: APPLICATION OF THE MONITORING APPROACH IN DIFFERENT PROGRAMMES.

After describing a revised TMon approach in chapter 5, this approach was applied to a second set of five case studies described in chapters 6-10. This step addresses the third research question: "What can we learn about this monitoring approach through its application in different cases?" I played a different role in these cases. The cases are, respectively:

- Case 6: Monitoring TPLZ: TPLZ (Dutch: Transition Programma Langdurende Zorg) stands for Transition Programme in Long-term Healthcare. The projects of this programme were monitored to stimulate continuous and joint reflection by programme managers and project leaders. I was involved in the design process and offered regular advice over several years.
- Case 7: Monitoring Transforum: This case is about the monitoring activities to support Transforum's process of vision development. I was only involved in the early stages of the monitoring.
- Case 8: Monitoring New Gas: Platform New Gas is a programme that wants to stimulate a sustainability transition in the gas system and the energy system at large. The transition dynamics in the gas system were monitored to reflect on the existing transition scenarios and set-up of the platform. Transition monitoring remained a one-off activity. I was responsible for the design, implementation and findings of the monitoring.
- Case 9: Monitoring the Innovation Agenda Energy (IAE): Innovation policy by the Dutch government based on an innovation systems approach lead to the formation of some thirty innovation programmes. To standardize the monitoring and evaluation procedures, a single monitoring design was developed for all these programmes. This case describes the design process in which I was part of the design team.
- Case 10: Monitoring the Rotterdam Climate Initiative (RCI): The Rotterdam Climate Initiative is a regional energy programme with a high ambition to mitigate CO_2 emissions. This is a case in which transition monitoring initially failed. Especially in the first year, I was an active member of the team that designed, implemented and redesigned the monitoring activities.

These cases were selected because of their diversity. They are sufficiently different to further explore the key challenges of the TMon approach (see previously). These relate to the final research question: What are the possibilities and limitations of this monitoring approach with respect to (a) multi-level monitoring, (b) application to different programme strategies, (c) regular redesign of monitoring activities and (d) different modes of monitoring?

Topics (a-d) of transition monitoring are explored in different cases. With regard to strategy and mode of monitoring the cases are classified according to concepts that will be presented in chapters 3 and 4 (as they are based on the initial pilots). Table 2.1 presents an overview. In the concluding chapter (chapter 11) the findings from the different cases are compared.

Table 2.1; case overview

Topic	*TPLZ*	*TransForum*	*New Gas*	*IAE*	*RCI*
Multi-level monitoring	Focus on project-programme interaction	All levels	Focus on programme-transition field interaction	All levels	Focus on programme-transition field interaction
Strategy	Transformative	Transformative	Visionary	Visionary	Planning
Monitoring redesign*	Failed redesign	Redesign under a general framework	*NA*	A flexible design proposed	*NA*
Modes of monitoring	Programme wide reflection	External reflection	External reflection	NA	External reflection

**This can only be investigated in cases where monitoring is implemented for several years. Monitoring New Gas was a one off activity, monitoring the IAE consisted of a design only that was not fully implemented at the time of writing. Monitoring redesign took place twice in the RCI, but this was less of a result of earlier monitoring findings and developments than of the initial mismatch between the TMon approach and the monitoring needs of RCI.*

A distinguishing feature of TMon is the combination of programme, project and transition field monitoring. Monitoring TPLZ focuses on the relation between project and programme development. This case has two units of analysis: monitoring of individual projects by the programme and by a particular project (experiment Prinsenhof, see chapter 6). Monitoring New Gas and RCI focuses on the relation between the transition dynamics in the gas system and the platform. It points to the opportunities of strategic alignment to other transition scenario's and dynamics in the transition field. Monitoring TransForum and the IAE shows how developments at all three levels may be related to each other.

Two strategies are assumed relevant for transition programmes and the TMon approach. Each of these strategies (a transformative or a visionary strategy) is described in two cases (respectively TPLZ /TransForum and New Gas /IAE). The fifth case (RCI) provides the counter-argument by attempting to apply the TMon approach in a programme with a different strategy (RCI with a planning strategy).

A third feature of the TMon approach is that monitoring activities are regularly redefined based on the results from earlier monitoring activities and on-going developments. Studying this process requires looking at programmes that have been monitored for a longer period. This is only the case for monitoring TPLZ and TransForum. The case study on TPLZ is a case in which redesign failed. Although it was originally intended that monitoring design would be enlarged and refined this did not take in place. In TransForum the monitoring activities were renegotiated annually. The next chapter will describe the first step of this research and identify key themes for transition monitoring based on five pilots.

Finally, in chapter 4, four modes of monitoring are described. Three of these modes have been explored empirically. Three cases (New Gas, TransForum and RCI) explore the mode 'external reflection'. TPLZ explores internal reflection and the monitoring for the IAE was designed as information for daily management.

CHAPTER 3 PILOTING TRANSITION MONITORING

It's worse than Tiririca! *(excerpt from Guijt's thesis on participatory monitoring in development programmes)*

'Tiririca' (Cyperus rotundus or purple nutsedge) is a weed that grows profusely in the fields of smallholders in Minas Gerais, Brazil. Once cut, the weed sprouts back even more ferociously than before, teasing the farmer with yet more shoots. The more it is tackled in this way, the more problematic it becomes until a structural solution is found.

The existence of 'tiririca' – and the power of its metaphor for describing the construction of collective learning – came to my attention in 1996. I had been working with small-scale farmers, trade unionists and NGO staff who seek to create a societal alternative based on agro-ecological principles in which small-scale farmers are able to realise their aspirations and satisfy their needs. […]

We were developing a participatory monitoring system that could guide strategic thinking and enhance results. To round off the first design workshop in the municipality of Araponga (Minas Gerais), we were evaluating progress and had invited reflections from participants. After some general murmurings of 'interesting' and 'difficult', Pedro Raimundo dos Santos, a local smallholder, stood up and remarked wryly: 'É pior que tiririca! Quando resolvimos uma coisa, outras aparecem.' 'It's worse than 'tiririca'. Every time we resolve one issue, several more appear'.

The first steps in developing the monitoring system together had raised more questions for us all than answers. This metaphor persisted and became a good description of the process in subsequent years that initially seemed to be straightforward and well thought out. Yet our process was marked by unexpected twists and questions at each step, forcing us to identify what underlying issues we had overlooked.

Irene Guijt, 2008

3.1 INTRODUCTION

The first step of developing a transition monitoring approach was drafting a broad, preliminary monitoring framework. This framework was piloted in five different programmes to identify the key empirical issues for transition monitoring. This chapter describes this first design cycle which involved five pilot cases of transition monitoring. Evaluating these pilots resulted in different issues that guided the further development of transition monitoring and especially the needed theoretical building blocks for transition monitoring (chapter 4).

CHAPTER OUTLINE

After describing the preliminary monitoring framework (section 2), section 3 presents the evaluation framework for the pilots. The pilots themselves are shortly described in section 4. This description reveals that monitoring activities carried out in the pilots were quite diverse and were not always successful. Section 5 compares the different pilots to find out why the pilots produced mixed results. This section points to the effect of different levels of co-production and framing of transition monitoring, how programme dynamics resulted in changing monitoring requirements and the challenge to develop transition monitoring for programmes that operated in a bottom-up manner without a transition scenario. Section 6 concludes that the preliminary framework offers potential but (especially given the intensive co-production) is too broad

to monitor in full. It argues that instead of developing a complete set of indicators it should better focus on understanding when what type of information is needed for a programme and which type of monitoring process is required.

3.2 PRELIMINARY MONITORING FRAMEWORK

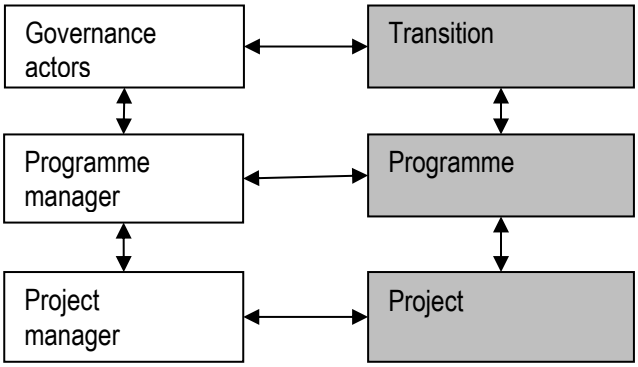

Figure 3.1 preliminary monitoring framework

The piloting concerned on a preliminary monitoring framework that was based on initial ideas from research proposals and meetings. In these first proposals (Rotmans, Minnesma et al 2005), the aim was to combine a systems perspective, actor perspective and learning/reflection. The metaphor for transition monitoring was an airplane cockpit. In this cockpit programme managers and transition scientists initiate a dialogue on the goals, desires and steering suggestions for the programme based on their interaction, the window of the cockpit (broad and open perspective) and the instrument panel (indicators). The preliminary framework has three core features:

1. **Monitoring dynamics at project, programme and transition-levels (multi-level monitoring).** In preliminary interviews, policy makers, transition scholars and programme managers made clear that transition monitoring was expected to focus both on transition dynamics and on transition management activities. With respect to programmes, three different levels were identified: the larger transition, the programme and projects. Each of the three levels has different change agents that influence their on-going concerns on the levels (see figure 3.1). The key change agent at the programme level is programme management, at the project level, it is the project manager and within the larger transition for example the governance actors that are relevant to the programme because of their power in the transition process and/or funding relations to the programme. The three levels form a hierarchy: the higher levels provide the context for lower levels and lower levels influence the higher level context.
2. **Monitoring these developments on three dimensions: the change process, the transition scenarios and sustainability**. Transition scenarios describe the ambitions of change agents. Project proposals, visions for the long term and programme strategies fall under this this category. The adjective 'guiding' is added to stress that these scenario's guide short-term action. The change process is about the actually realized changes. These changes may refer to a changed composition of the network and portfolio, current interventions, transition dynamics, project outputs, degree of innovativeness, etc. The third type of indicator is a sustainability indicator constitutes the norms against which changes and transition scenarios are valued.

3. **Approaching transition monitoring as a co-production process of programme managers and transition experts.** Transition experts bring more generic theoretical expertise and programme managers bring knowledge and programme management questions specific to the programme into the process. Together they define indicators on the change process, sustainability and transition scenarios they want to monitor, analyse the data and develop recommendations to improve the programme.

3.3 EVALUATION FRAMEWORK OF THE PILOTS

The preliminary monitoring framework was not very detailed and applied to different programmes by (partially) different monitoring teams. This resulted in variety in the actual monitoring indicators, activities and recommendations that were the output of the monitoring pilots. These monitoring outputs in turn had different outcomes for the programmes. To gain insight generic issues for transition monitoring the pilots were systematically compared based on the principle of realist evaluation. After a short introduction to realist evaluation, the analytical framework for the evaluation of the pilots will be presented including the methods used to collect data.

REALIST EVALUATION

Realist evaluation is developed by Pawson and Tilly (Pawson and Tilley, 1997). According to them, evaluation approaches that only focus on the effects of a particular intervention ignore the critical role of the context in which an intervention is performed. For some groups or in some context an intervention may work well, while in others not. They argue that this is the prime reason why many evaluations show little, or mixed results. The prime concern of an evaluator should be to study why an intervention works (or not) under particular circumstances. This results in a better understanding of the intervention and may help to reproduce successes and prevent failure for similar interventions. Realist evaluation is rooted in a realist ontology. In this ontology mechanisms of change are induced by both the context and an intervention (see figure 3.2). To evaluate an intervention requires answering the question: "*what works for whom in which circumstances and why".*

The intervention in the pilots were the monitoring activities and the circumstances the programme context. The interplay between context and activities resulted in different outcomes of the pilots: the learning processes and changes in the programme as a result of the monitoring activities. This is presented in figure 3.2.

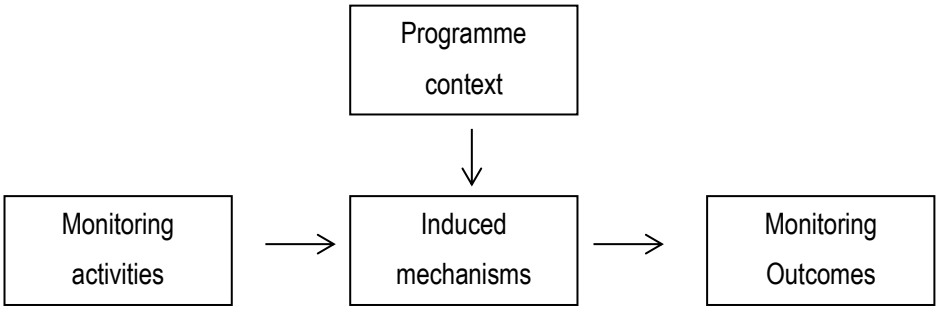

Figure 3.2 transition monitoring as a realist intervention

Realist approaches are especially useful for meta-evaluations (Pawson 2001: 11) like the cross-case comparison of pilots. A meta-evaluation can defined both as an aggregation or synthesis of multiple evaluations (say, a multi-evaluation) and to thinking and reflecting on existing monitoring activities or evaluations (say, an evaluation of an evaluation) (Uusikyla and Virtanen 2000). In this analysis both definitions apply: transition monitoring was evaluated through the synthesis of five pilots of transition monitoring and subsequent reflection on transition monitoring.

EVALUATION FRAMEWORK

The different activities, programme context features and outcomes of the monitoring pilot were evaluated. With respect to the monitoring activities, specific attention was paid to the intensity of the co-production process and the focus on different levels and dimensions. With respect to the programme context, (i) the interaction with other reflexive activities in the programme (like strategy development, project appraisal and other monitoring and evaluation activities) was described, as well as (ii) the presence of a transition scenario at programme level, (iii) programme dynamics and (iv) the framing of transition monitoring by the involved programme managers. With respect to the outcomes, programme staff and experts were asked about the relevance of the transition monitoring process and steering suggestions. This relevance concerned both the instrumental value of findings (whether steering suggestions were to be implemented) and the learning effects (whether the monitoring process led to a better understanding how the programme could influencing transitions processes). These aspects were described during the intake, the monitoring process itself and ex post after several months of monitoring (see table 3.1).

ble 3.1 Evaluation criteria for the pilots

Evaluant	*Description*	*Intake*	*Participant observation*	*Ex post*
Monitoring activities				
Intensity of co-production	*Contribution of both experts and managers to terms of reference, indicator design, data collection and formulation of steering suggestions*			
the use of different levels and types of indicators	*Description based on framework and report*			
Programme context				
the interaction with other reflexive activities	*Description*			
Transition scenario of the programme	*Both history and during monitoring pilot*			
Programme dynamics	*Both history and during monitoring pilot*			
View of transition monitoring	*Based on Q sorts*			
Monitoring outcomes				
Management relevance (instrumental)	*Judgment by programme managers whether resulting recommendations were useful and implemented*			
Management relevance (learning)	*Judgment by programme managers whether monitoring activities led to a sharper focus on influencing transitions processes*			

During the intake (from April to June 2007), data was collected through interviews with programme managers and a Q sort on their view of transition monitoring, In this interview, programme managers were asked to describe the history of their programme, existing monitoring and evaluation activities and the transition the programme was looking for. Part of the interviews was a Q sort to analyse the way programme managers framed transition monitoring. During the monitoring process additional information was collected through participant observation and analysing the monitoring reports. Some 8 months after initiating the monitoring both the involved experts and the programme managers were asked to fill out a survey and were subsequently interviewed to better understand the monitoring process and its outcomes.

The survey, Q sort and interview questions can be found in the appendix. The Q sort is not as common a research method as surveys and interviews. Q Methodology is an approach to study people's subjectivity (Brown, 1980; Cuppen, 2010). With the Q sort programme managers were asked to rank statements on a 7 point scale from 'this is exactly how I see transition monitoring in my programme' to 'this doesn't describe the role of transition monitoring in my programme at all". The statements were drawn from previous discussions on transition monitoring in a community of practice and related to the nature of the knowledge to result from transition monitoring, the roles of external experts and programme managers in the monitoring, and the role of programmes in stimulating a transition. A factor analysis of these rankings (along with the comments made by the programme managers during the ranking exercise) was used to infer different framings of transition monitoring. The typical way to interpret a factor in Q methodology is to look at the statements with the strongest agreement and disagreement for that factor. In addition, the statements that distinguish most between one factor and the other factors are useful in interpreting a factor because these indicate how a factor is different from the other factors.

3.4 THE PILOTS

INTRODUCTION OF THE PILOTS

In winter 2007, transition monitoring pilots started in five innovation programmes in the sectors Construction (the PSIB programme), Water Management (Leven met Water), Mobility (Transumo), Agriculture (TransForum) and Geo-information (RGI). In order to avoid confusion over their respective acronyms, we will refer to these programme by the sector in which they operate. These innovation programmes were partially publicly funded programmes initiated to strengthen the knowledge infrastructure by connecting scientific disciplines, strengthening the ties between science, policy and business and bringing product and process innovations into practice under the BSIK arrangement[5]. Under this BSIK arrangement, programmes were obliged to account for their contribution to scientific, economic and social development and on innovation and knowledge integration. Generally this meant regular reporting on outputs like the number of dissertations, scientific articles, etc. These programmes were not necessarily initiated to pursue a *fundamentally different* type of scientific, economic and social development or that these developments should be valuable for *sustainable development*. The five programmes that piloted transition monitoring however were at least partly oriented towards sustainability transitions, were in various degrees familiar with transitions thinking and interested in exploring its further potential. Prior to transition monitoring there were already contacts with the BSIK programme that

[5] *Just like the KSI programme (Knowledge network for system innovations and transitions) that funded this research.*

funded this research (KSI). These contacts consisted of consultancy projects in which KSI members advised the other programmes and shared 'testing grounds' and projects. These programmes therefore offered a relevant and practical opportunity to pilot transition monitoring. Managers saw the BSIK arrangement as primarily financial and output oriented with less attention to outcomes in the sense of a contribution to society at large. As a result programmes were inclined to realize output first and only later start defining their ambitions at outcome level. The programmes started around the same period.

Each monitoring pilot was conducted by a monitoring team of 3-5 people, usually consisting of one or two programme managers, a transition expert (PhD student/ researcher/ consultant) and a project manager contracted by KSI who supervised all pilots. The pilots started in the first half of 2007 and were evaluated in winter 2008 (Taanman, Diepenmaat et al. 2008). By this time not all plots had produced extensive results. After the evaluation period some pilots slowly ended (Geo-information and Construction), some continued (see chapter 7 on agriculture/ TransForum), while others (Mobility and Water Management) over time developed into a separate strand of research that resulted in an approach to evaluate innovation programmes based on the degree of receptivity between actors directly involved with the programme and those outside the programme (see Bressers, 2011).

In the next pages the monitoring activities in each pilot and their outcomes are briefly summarized.

CONSTRUCTION

This pilot was the first to start. The manager in the Construction stressed in April 2007 that he needed the monitoring to be 'quick and dirty' with an emphasis on practical recommendations to make the programme more transition-minded before the mid-term review of the programme that year. The following months, various sessions between transition experts and programme managers resulted in four or five different lists of potential indicators (together some 26 pages long). Each set had a different goal, focus and theoretical background. A workshop with a broader group of programme stakeholders took place to generate more indicators. Afterwards, 14 indicators were selected that primarily addressed the construction sector (through a survey, N=100) and the projects. No shared understanding on what a 'sustainable construction sector' entails was reached and therefore no sustainability indicators were considered. The 14 indicators mostly focused on a single level and dimension. An example of an indicator that relates several levels is the indicator "*Percentage of the project portfolio that addresses experienced problems in construction*". This indicator confirms that around 75% of the projects in PSIB do address the problems most commonly perceived by the sector. However, most people in the sector did not feel that their problems were addressed. From this, the monitoring report concluded that apparently the activities of the programme and others were not known and/ or felt to be sufficient (dHaese and Diepenmaat 2007).

In the meanwhile the mid-tem review of the programme for the BSIK agreement resulted in the decision to discontinue the programme. It could no longer make new financial commitment and the programme was to end in January 2008. It had one year left to communicate its lessons and successes and finish the programme.

Interestingly enough transition monitoring made it to the top 10 successful projects in the final programme report, although both the transition expert and the programme manager did not see a lot of impact from the monitoring efforts. The programme manager did not feel that the recommendations were practical enough. The transition expert indicated

that the programme's commitment grew less over time and that by the time the monitoring results were presented there was too little capacity within the programme to implement the changes. The Construction programme manager's understanding of the transition dynamics improved but according to him this was largely the result of other studies and on-going learning within the programme.

MOBILITY

The Mobility programme was monitored with respect to five themes. These were (1) programme network composition (balance between government, business and knowledge institutes), (2) balance in the project portfolio between incremental to transitional projects (3) problem framing (present or not, which elements, and which diversity), (4) vision (presence, elements, and diversity) and (5) transition pathways (presence, elements, and diversity) (Bressers, Diepenmaat et al, 2008a). This resulted in a 'programme scan'. Data collection was based on interviews with programme managers and a small survey among project managers (N=9 out of the 20+ projects). The scan concluded that the transition scenario needs more work, especially with regard to the vision on sustainable mobility and pathways to realize this vision. Some existing ideas were identified that could help the programme in this process. Project leaders had difficulties to answer questions about transition pathways and the 'transitional' nature of their projects. They often saw the project goal as an optimization of the sector but regarded the ideas and ways of working as system-changing. Recommendations included a further analysis of the role of the different project stakeholders in a transition process, continue working on a transition scenario and using this scenario to improve the set-up and contributions of individual projects to this transition.

The manager in the Mobility programme regarded the outcomes of the monitoring pilot as positive. The monitoring aided in setting up a range of interventions to make the programme more transition oriented. Among these programme interventions were the development of a transition scenario with respect to the general long-term vision and more specific transition pathways. The monitoring findings and discussions further supported specific sessions to 'transitionize' projects. This 'transitioning' of projects was already taking place in 2007 as part of another set of activities by transition experts (see for example Avelino, 2009 and Van den Bosch, 2010). The first conclusions were also used in the programme's mid-term review.

WATER MANAGEMENT

The programme on Water Management was primarily interested in transition monitoring to improve their existing outcome monitoring. In this way they wanted to be able to show more clearly the effects of the programme in its final year. The monitoring was based on the same framework and type of data collection as in Mobility (Bressers, Diepenmaat et al, 2008b). The monitoring report concluded that the transition scenario of the programme had been clear from the start. Especially the first projects were incrementally oriented. Later projects were more transitional. Recommendation were to stimulate the interaction between projects and jointly identify the essential themes for these projects. This could strengthen the link between project and programme-level goals. An example of an indicator was "Network composition" (Bressers, Diepenmaat, 2008b). This indicator lists the number of businesses, public sector organizations and knowledge institutes within the programme, but also the number of actors outside the water sector and the estimated ratio between actors from large-established organisations (~regime players) and of smaller new organizations (~niche organisations). The purpose was to monitor whether the full diversity of the sector was represented in the programme.

Like in the mobility programme, the preliminary outcomes were regarded to be quite positive. Although final results were not yet clear at the moment of the evaluation, programme managers and the transition expert were positive that after initial delays, the monitoring was coming up to speed and would later be able to show the programme's contribution to the transition in Water Management.

AGRICULTURE

The programme on Agriculture was analysed by a DRIFT researcher based on interviews and active participation in programme activities in which he also facilitated several workshops. The programme was analysed by looking at the transition vision, problem framing, transition pathways, experiments, scaling up and transition monitoring. Based on the analysis, the expert judged how well the programme performed on each of these themes (see figure 3.3). One of the main conclusions was that the programme was strong in its project support, but rather weak in setting an agenda for a sustainability transition in agriculture. To monitor the transition dynamics in the sector as a whole report, the transition expert could not work from a strong transition scenario of the programme. Instead he included a historical transition analysis of agriculture based on his own and other's expertise.

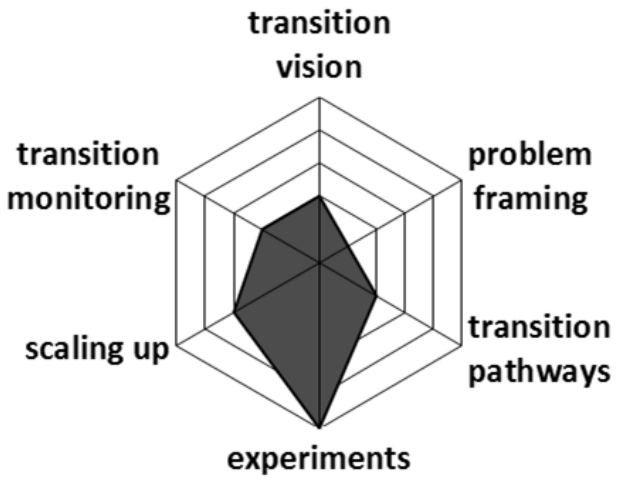

Figure 3.3: Strength of the programme in Agriculture with respect to different transition management criteria according to TM expert

The resulting monitoring report. described the programme as being strong in exploring a range of local innovations while its potential to contribute to a larger transition process remained underexposed. The report concluded that the programme was less concerned with the question of how innovation projects could add up to a sustainability transition and was "vision-shy". Both the monitoring process and these conclusions were criticized by programme management. They stated that the lack of a transition scenario at the time was the result of a conscious, strategic choice by the programme. They did not agree with the transition management claim that having such a scenario is prerequisite for a transition programme. In addition, the programme manager criticized the independent role of the transition expert in the process. He wanted more programme involvement in the monitoring process. The final report was not made public.

GEO-INFORMATION

The programme of Geo-information was analysed and compared to transition management concepts. The analysis and reflection focused on six themes: (1) the system boundaries (definition and shared understanding by programme stakeholders), (2) balance of the project portfolio between more incremental and radically innovative projects, (3) the composition of the network based on the involvement of niche players, regime players and outsiders, (4) system analysis and shared problem perception, (5) shared vision and (6) transition pathways. This analysis was based on a review of programme reports and interviews (Van de Lindt 2009). A range of recommendations was given with a focus on how the transition scenario for geo-information could be made more explicit (for example by developing different pathways).

Monitoring activities in Geo-information suffered serious delays. It was the last one to start and it was difficult for the monitoring team to meet regularly due to the busy schedule of the involved programme manager. In the discussions there seemed to be a constant feeling that Geo-information was the odd one out in the pilots due to its technical focus and the lack of sustainability implications. It was a continuous discussion whether transition (management) thinking was applicable for the programme. As a result the outcomes can be considered unsatisfactory.

3.5 ANALYSIS

The previous section showed that the pilots had mixed results. While the pilots in mobility and water management were largely regarded successful by the involved experts and managers, the pilots in construction, agriculture and geo-information were not. Although the particular circumstances in each case will have played a role (eg whether experts and programme managers got along well or the premature ending of the construction programme), systematic comparison of these pilots also reveals more general explanations.

CO-PRODUCTION IN THE MONITORING PROCESS

First, let's look at the influence of the intensity of co-production on the perceived outcomes.

The intensity of coproduction was discussed in the survey, interviews and participant observation. For example in the survey, managers and experts listed the degree to which each party contributed to different stages of the monitoring process: (1) deciding on the focus of the monitoring, (2) indicator design, (3) collecting information and (4) formulating recommendations. In three programmes -Construction, Geo-information and Agriculture-, the involved managers and transition experts indicated that the transition experts had a much larger contribution to the monitoring activities than the programme manager, indicating a low level of co-production. In the programmes on Geo-information and Agriculture there was less frequent contact between members on the monitoring team than in the other three programmes. Unlike the programmes on Construction, Water Management and Mobility, these two programmes did not have a PhD student stationed. In Geo-information and Agriculture there were also less connections with other reflexive activities. The low intensity of co-production in Construction is somewhat surprising. It was the first programme to start with transition monitoring, there had been a substantial number of meetings, a PhD student spent time inside the programme and attention was paid to the connection to the mid-term review and a strategic project in which a transition scenario and agenda were developed. In the questionnaire however, both the expert and the manager indicated that the transition experts had the most influence on the monitoring.

Table 3.2 lists the level of co-production, the manager's frame on monitoring and the perceived outcomes. The results show that programme managers and transition experts are more positive on the outcomes of transition monitoring when there is a high level of co-production. In addition, all participants in the pilot (managers and experts) indicated that the transition monitoring did not demand a lot of time from programme management and that they would like to intensify the process.

Table 3.2: Relation between the level of co-production, perception of transition monitoring and outcomes

Programme	***Level of co-production***	***Manager's framing of monitoring***	***Perceived outcomes***
Water management	High	Management information	Positive
Mobility	High	Sense-making process	Positive
Construction	Intermediate	Management information	Little
Geo-information	Low	Analytical tool	Little
Agriculture	Low	Sense-making process	Little

Also taking into account the way programme managers framed transition monitoring results in additional insights in the way co-production led to the perceived outcomes. . All programme managers emphasized that their programmes do more than transfer knowledge from science to practice and develop innovative concepts, but act as an intermediary organization that stimulates connections, delivers tailor-made solutions and steers on processes, content and network. With Q analysis three frames of transition monitoring were identified[6]:

1. *Transition monitoring as a sense-making process.* The managers in the Mobility and Agriculture programmes primarily adhered to this frame. They predominantly saw their programme as a learning organization. Monitoring was seen as a learning process to make sense of complex developments at project, programme and societal level and to develop interventions to deal with them. They emphasized that monitoring cannot reduce complexity, that output monitoring can have perverse effects and did not find it particularly important to develop SMART goals for projects and programmes to determine how they can be improved.

2. *Transition monitoring as an analytical tool.* This was the frame the programme manager on Geo information primarily adhered to. This manager saw monitoring primarily as a measurement tool to identify barriers, solutions and problems at projects and societal level. Perverse effects and difficulties with attributing causality were not seen as important issues, but scientific underpinning and separating the monitoring process and management were.

3. *Transition monitoring as operational management information.* The managers in Construction and Water management considered establishing goals and reducing complexity relatively important. At the same time they were aware of the difficulties of monitoring transition. Learning from projects and asking other change agents to solve problems the programme faces, were not very important. The emphasis was on what their programme can do.

[6] *Statistical analysis by Eefje Cuppen*

The manager's frame on monitoring may be linked to the kind of co-production in transition monitoring. The programme managers in Mobility and Agriculture primarily adhered to the sense-making frame. This further helps to understand the critique of Agriculture on the monitoring pilot. Much of the social learning potential of monitoring lies in the process of monitoring: in discussing with experts, programme managers and others which aspects are important, how to interpret data, etc. You would therefore expect that plenty of interaction and therefore intense co-production is essential. In Agriculture the manager's framing of monitoring as sense-making did not match the weak level of co-production and this indeed led to clashes and low commitment to the monitoring recommendations (this was improved in later TMon applications in the programme, see chapter 7). In Mobility the high level of co-production was in line with the manager's frame of monitoring as sense-making and the monitoring had better results. Especially for programme managers who view transition monitoring as sense-making, a high level of co-production may lead to better outcomes through intensive interactive learning.

The programme managers in Water Management and Construction took a more instrumental view of transition monitoring by emphasizing its benefits for providing operational management information. They wanted to reduce complexity by formulating and monitoring a clear set of goals. This information was to be used to demonstrate effects, distinguish successful from unsuccessful projects and develop a clear programme management strategy. However the type and timing of management information they needed differed. The manager in water management had a clear question: how can we improve our monitoring to identify our effect on the transition process? The managers were confident that the programme was on course and the sector largely agreed which changes in water management were needed (see also next section). The monitoring results would be needed by the time the programme would end, two years after the monitoring pilot started. The experts and managers were confident that they would be able to show the results more clearly by that time. The programme manager in construction also turned to transition monitoring for operational management information. However, this programme was changing its strategy to become more explicitly transition oriented. It operated furthermore in a sector where many companies were critical of the programme and within the programme it was doubted whether there was a real sense of urgency in the sector to change. This resulted in a pressure to show monitoring results and clear recommendations quickly, while the questions that the monitoring was to answer were less clear given the changing programme strategy. A further complication was that it was the first pilot to start and the monitoring framework was therefore very premature. For example the distinction between different monitoring dimensions was only made several months into the pilot.

When the involved expert and programme managers have conflicting frames on transition monitoring, they are likely to have different expectations and norms about monitoring leading to conflicts and a negative effect on the outcomes. In the Construction programme the expert seemed to frame monitoring more as an analytical tool than as a tool for operational management information. She made critical remarks that meeting scientific standards of transparency and reliability were apparently not the '*aim*' of the monitoring and that '*too few scientific criteria were formulated for the selection of indicators*'. She explained how indicators were chosen more because of the enthusiasm and discussion they evoked than on whether they were accurate indicators for the underlying concepts. Therefore she felt that the monitoring gives a '*colored but relevant image'*. Sometimes these discussions led to recommendations straight away. This bypassing of data collection and analysis and proceeding straight to recommendations also occurred in other pilots. The

programme manager however wanted quick and practical recommendations. It is illustrative that he thought that the throughput of monitoring was too slow for management relevancy given the programme dynamics, whereas the expert indicated that she would like more time to guarantee the scientific quality and robustness of information.

TRANSITION SCENARIOS AND MONITORING

The role of transition scenarios in transition monitoring was a recurring topic of discussion in the monitoring teams. The project leader of the monitoring pilots and the other transition experts considered having a transition scenario to be very important. The project leader was an experienced consultant in multi-actor processes and had written a PhD about the importance of transition scenarios (which he refers to as multi-actor perspectives) and ways to model them (Diepenmaat, 1997). Other experts had a background in transition management literature (like Loorbach, 2007; Rotmans, Kemp et al. 2001). This literature considers problem and system analysis, visioning and the development of transition pathways as the first steps to intervene in a transition[7]. The experts also stressed the instrumental value of transition scenarios to help define change and sustainability indicators. This corresponds to the common logic of project and programme monitoring and evaluation, which is usually based on monitoring or evaluating changes in correspondence to predefined plans, outcomes etc.

As described, the programmes on Agriculture, Construction and Mobility did not have an explicit transition scenario about a sustainability transition during the pilots. In the programme about Geo-information there was a transition scenario, but this was not connected to sustainable development. These differences are partly explained by the BSIK arrangement of which these programmes were part (a transition scenario was not required within the BSIK arrangement) and their focus (Geo-information is not commonly associated with sustainability issues).

Two other reasons for having a programme level transition scenario have more general implications for transition monitoring. First, the programmes that had the clearest scenario (Water Management and Geo-information) also indicated that the transition they tried to influence had passed the take-off point (see figure 3.4). They considered the sense of urgency as respectively the biggest and second-biggest driver of the transition dynamics. A lack of a transition scenario in Mobility and Construction correlated with the sense of urgency they experienced in the sectors they tried to influence and the absence of large transition dynamics. In Agriculture a sense of urgency was felt to be present in the sector but

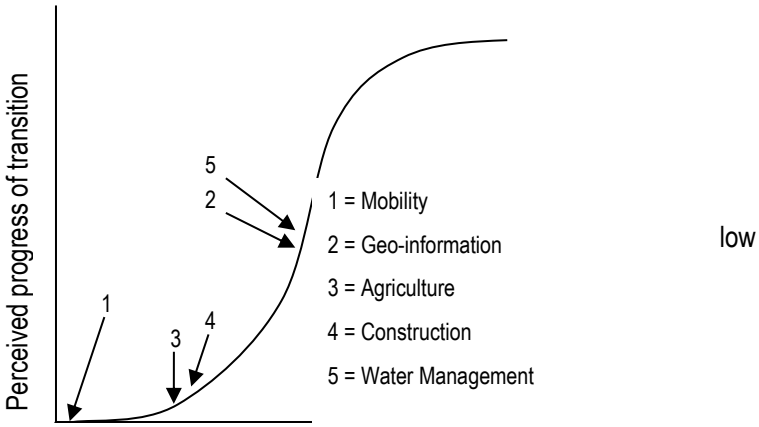

Figure 3.4: Programme managers' assessment of the phase his desired transition was in

[7] *Note that both Diepenmaat and TM literature do not require a fully detailed transition scenario. They expect that transition scenarios change, become more concrete over time and a diversity of scenarios should be explored. However some basic ideas about the desired changes are considered necessary to initiate targeted interventions.*

also a lack of vision. This suggests that innovation programmes that perceive little sense of urgency and transition dynamics, may have more problems developing a clear transition scenario[8]. Secondly, two programmes (on Agriculture and Mobility) indicated that a more worked out idea about what a sustainability transition would look like, should be seen as a result of the programme rather than a starting point. The programme manager in Mobility said: "*Our ideas during the start-up were very clear: there is no such thing as the vision on sustainable mobility. We were not going to put a lot of effort in developing such a vision to judge whether a project is right or wrong for our programme. We turn it around: we let visions emerge from the field. Bottom-up if you want to use that word*." The Agriculture programme was also explicit about not having an initial vision. The manager: "*we do not want an explicit view on what is sustainable and what the agricultural innovation system should look like, at most we want to create this over time. And even then a vision on project level is more important than one on programme level. This is because sustainability is a contextual, political concept. Inherently normative*."

You may expect that the emphasis on transition scenarios by the transition management experts would lead to problems in the Agriculture, Construction and Mobility programmes. However transition management ideas were seen as an important improvement in Mobility and Construction and the critique about the programme's lack of transition scenario was therefore accepted. In Agriculture, transition management ideas were not seen as a legitimate standard against which to monitor the programme and the conclusion that the programme was 'vision shy' was rejected.

A lack of transition scenario affected transition monitoring in three ways. First, it resulted in many discussions on this topic. These discussions were often appreciated, but without systematic collection of data on on-going developments, cannot be regarded as monitoring. Second, it made it difficult to identify the changes and sustainability issues in the transition field that were to be monitored. Third, the lack of transition scenario complicated monitoring the contribution of projects to programme level goals.

PROGRAMME DYNAMICS

All programmes *were developing and refining* their transition scenario in the period the pilots took place, whether they started with a scenario or not. This was partly due to the discussions in the transition monitoring process. Other reasons included the desire to identify the programme's total results, wanting to provide more focus to the programme, stimulate interaction between projects, offer suggestions for new programmes and influence policy makers and others to provide continued support for the changes the programmes initiated.

In general, managers affirmed the statement that the focus in the first years of the programme was on organizing the programme: selecting projects, staffing the programme bureau, etc. The next step was to start reflecting on whether they were still doing the right things. Rethinking and modifying the programme was a continuous process in all pilot programmes although the modifications made differed in size. The manager in Mobility referred to this as a ' fact of life': that you do things and later reflect whether that was such a good idea. Over time, most programmes became more selective about the projects they wanted to support and more active in their efforts to realize new projects and support existing projects.

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[8] *The implied causal relation may go either way here: either large transition dynamics are always accompanied by many explicit scenarios and a large sense of urgency meaning that programme managers can draw upon these existing scenarios, or programme managers can more easily see on-going transitions when they have a clear idea what dynamics to look at, or both.*

Such programme dynamics influence the information needs. This was particularly clear in the Construction programme. When transition monitoring started at the construction programme, it was making a fundamental change from a more research-based knowledge programme towards a more practice-based transition programme as a result of internal reflection and advice by transition experts. This led to fundamental questions like “what is the transition we should be going for and why?”. The following months, various sessions between transition experts and with programme management led to a set of indicators that everybody agreed on. In the mean time the major management question of the programme changed. Now the programme was wondering: “what is our role in this process” and “what kind of information do we need on our projects, programme and the construction sector to better fulfill our role”? The developed indicators did not help answer these kind of questions and were no longer relevant for the managers. This points to the need to anticipate information demands and/or to build flexibility into the monitoring process.

3.6 CONCLUSION

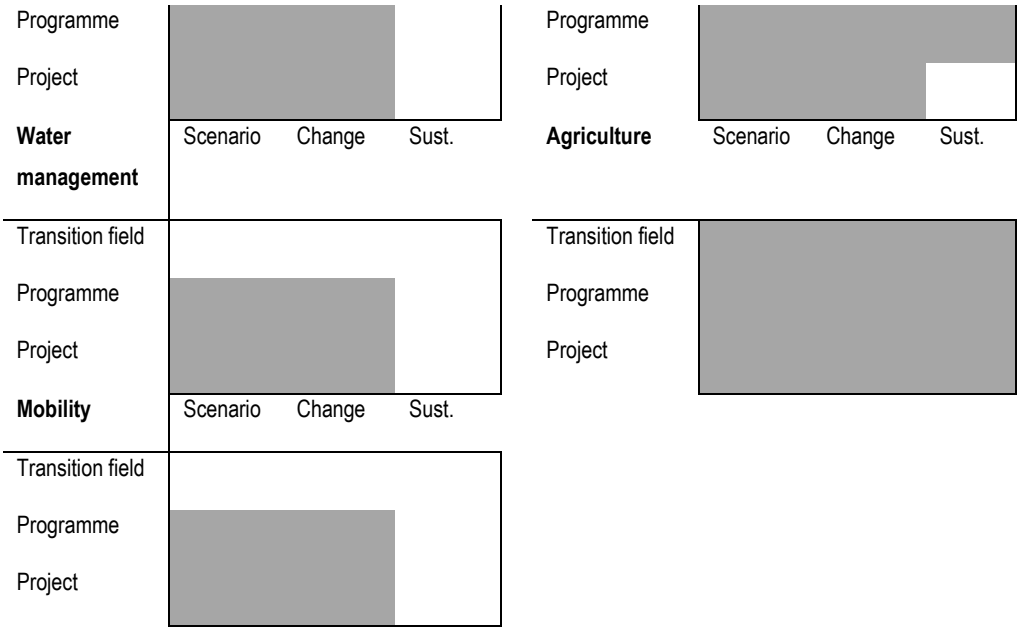
The pilots do not suggest major modifications to the general monitoring framework as such. All programme managers and experts emphasized the importance of combining transition field, programme and project monitoring prior and after the pilots. The importance of monitoring transition scenario’s, changes and sustainability as different monitoring dimensions was recognized and the pilots highlight the importance of co-production for successful transition monitoring.

Several indicators were explored that are potentially useful for other transition monitoring applications too. Transition scenarios on different levels were monitored based on the (i) problem framing, (ii) vision, and (iii) pathways. All programmes were developing their scenarios during the pilots and considered this development important. This provides a good argument to monitor this scenario development. Results may be analysed with meta-indicators on for example their diversity and congruence between levels (is a project leader’s scenario congruent with the programme’s scenario?), between dimensions (do scenarios materialize) and internally (are problem framing, vision and pathways congruent?). On the programme level (iv) network composition and (v) balance between transitional and incremental projects seem promising. Programmes were all creating new networks with new players and relations and discussed the need for more radical or incremental change.

However other issues emerged and not all pilots were successful. None of the pilots monitored the transition field dynamics in any detail and also sustainability indicators were generally lacking (see table 3.3). At the same time, the pilots indicated that continuously monitoring all scenarios, changes and sustainability issues at all levels would be too time-consuming. Especially given the considerable amount of time that at took for experts and programme managers to gain a shared understanding about which information would be meaningful. Monitoring everything is also likely to result in information overload. Choices are necessary to avoid that resources and attention are spread too thin.

Table 3.3 Coverage of the monitoring framework in the pilots. The grey cells indicate which levels and dimensions were addressed in each pilot.

Construction	Scenario	Change	Sust.	**Geo-information**	Scenario	Change	Sust.
Transition field				Transition field			



The pilots show that different expectations of the respective roles of experts and managers in the co-production process, changing information needs and a mismatch between transition management theory and programme strategies resulted in unsuccessful monitoring applications. The main challenge for further development of the transition monitoring framework is therefore not about developing more indicators that encompass all levels and dimensions. The main design challenge is to align the monitoring activities and process with the programme strategy and dynamics and the framing of transition monitoring by programme managers and to ensure fruitful collaboration between experts and programme managers. This may help to get to a smaller set of indicators that are meaningful for programme improvement more quickly.

The pilots were evaluated with a realist evaluation. This type of evaluation explains outcomes by clarifying the underlying, context-induced mechanisms. The main mechanism behind effective monitoring deals with alignment to the programme context. However the pilot did not yet clarify *why* and *how* alignment leads to effective monitoring. A more refined understanding of this key mechanism is needed to better evaluate additional transition monitoring applications. Considering remarks made in discussions during and about the pilots this mechanism seems to relate to issues like norms and values within the programme, how actionable the programme management recommendations are and the reliability of the monitoring methodology and results.

A better understanding of five key challenges may help transition monitoring to become a more useful instrument to improve transition programmes and enhance their effectiveness and will be explored in the next chapters:

Relating developments at different levels and dimensions. Programme managers in the pilots were critical of the usefulness steering suggestions based on individual indicators (ie when a lack of vision was indicated and the suggestions was simply to create one). They therefore valued the integrated focus on different levels and dimensions. However, monitoring all levels and dimensions in detail did not appear feasible nor desirable because of the resources needed to monitor everything and the resulting information overload. Various pilots got stuck in discussions on monitoring priorities. The challenge is therefore to get to a smaller set of indicators that are meaningful for programme improvement more quickly and without losing sight of the bigger picture. For example by creating a toolbox of transition

theories and developing heuristics which type of indicators are appropriate in a given context. This is strongly related to the next challenges.

Dealing with different programme strategies. There is no one-size-fits-all approach and monitoring activities need to be carefully attuned to the programme strategy. The pilots revealed different programmes strategies. The most striking difference is that some programmes start out with a transition scenario, whereas others develop such a scenario only in the course of programming. Especially for programmes without a transition scenario, monitoring was challenging and conflicts arose about the relevance of (the strongly vision-based) transition management approach as a theoretical basis to monitor these programmes. An understanding of different programme strategies and their implications for transition monitoring is needed.

Adapting to changing monitoring needs. As programmes develop, programme management needs change and so do information requirements. In the Construction pilot, the monitoring results consistently became available only when management priorities had already shifted, resulting in a failed pilot. In order to provide timely monitoring information, programme management requirements need to be anticipated and/or the monitoring needs to be flexible enough to adapt to changing programme management priorities.

Different views of co-production. The pilots confirmed the importance of co-production: the more co-production, the higher the results were valued. At the same time Q analysis and interviews revealed that programme managers in practice had different expectations on what such co-production entails. They framed transition monitoring differently. These framings could be connected to conflicts between programme managers and transition experts. Again there does not seem to be a uniform (one-size-fits-all) process of co-production and co-production needs to be unpacked in order to guide the cooperation between transition experts and programme managers.

Evaluating the programme fit. The previous challenges emphasize the importance of a good fit between TMon activities and the programme. Criteria are needed to evaluate whether this 'fit' is considered effective for a particular programme.

CHAPTER 4 THEORETICAL BUILDING BLOCKS

"*The appropriateness of a particular type of method is a function of its congruence with the type of problem under investigation." (Dunn, 1988: 724).*

This chapter presents the theoretical background of the monitoring approach. The pilot cases in the previous chapter identified a range of issues that require more theoretical clarification:

1. The definition and relation between different levels and dimensions of monitoring and its relation to transition theories.
2. Identification of different programme strategies to distinguish transition programmes from other programmes and distinguish between transition programmes that start with a transition scenario and those that start with concrete experiments.
3. Programme dynamics to anticipate changing programme management issues and focus monitoring activities accordingly.
4. Different framings of transition monitoring and its effect on the type of co-production needed.
5. Criteria to assess whether transition monitoring activities fit a particular programme.

This chapter presents and (in part) develops theoretical building blocks to deal with these issues and discusses their implications for transition monitoring. This chapter first roots the monitoring framework within transition literature, develops a theoretical toolkit and offers illustrations how different transition theories may be applied in transition monitoring (section 4.1). Sections 4.2 and 4.3 dig deeper into programme development. Section 4.2 identifies different programme strategies and 4.3 presents a cyclical programme development model. The theoretical background of different types of co-production further elaborates on the different framings of transition monitoring as identified in the pilots. It presents typology of modes of co-production depending on two ways to appraise on-going developments(opening up and closing down) and whether monitoring is used as an integral part of programme management or as a separate activity (section 4.4). Section 4.6 introduces the mechanisms through which monitoring may become effective. Section 4.7 wraps up the findings by listing seven characteristics of transition monitoring.

4.1 TRANSITION RESEARCH AND THE MONITORING FRAMEWORK

The pilots of transition monitoring (chapter 3) show that the integration of monitoring different levels (project monitoring, programme monitoring and transition field monitoring) and different dimensions (the transition scenarios, changes in culture, structure and practices and sustainability) was considered valuable. The three dimensions of transition scenarios, change and sustainability apply to all levels of the monitoring framework. This section briefly discusses transition research with respect to the different dimensions and levels.

Transition programmes are monitored by using the transition management theory developed by Loorbach (2007). However, for the transition dynamics, dynamics of transition experiments, etc. different theoretical perspectives may be used. Apart from transition management, the monitoring framework therefore does not make a particular transition theory (or 'the' transition theory) operational, but is a framework to which different theoretical perspectives can be applied. This results in a 'transition studies toolkit': a set of transition theories that may be applied to different levels if and when necessary for a particular monitoring application. After all: there is nothing as practical as good theory for monitoring and evaluation (Weiss 1995, paraphrasing Kurt Lewin).

DIMENSION 1: TRANSITION SCENARIOS

The dimension 'transition scenarios' in the monitoring framework is used to describe the long term ambitions of actors. A transition scenario consists (following Diepenmaat's description of perspective (2007)) of three elements: a description of the current situation (as is), a desired future situation (to be) and a 'script' which explains how the current situation can be changed into the desired future situation. The term therefore includes problem framing ('as is'), vision ('to be') and strategy, roadmap or plan (script)[9].

Developing transition scenarios is seen as a key policy instrument in the governance of transitions (Loorbach 2007, Rotmans et al. 2001), systemic innovation policies (Hekkert et al. 2007, Smits and Kuhlmann 2004) and sustainable development (Meadowcroft 2007, Weaver and Rotmans 2006). These scenarios offer an integral frame to orient short-term actions and evaluate programme development. Due to the complexity and multi-actor nature of transitions a realistic and attractive vision can only develop and become known through the interactive process of programming itself. This presents a paradox for innovation programmes: without a transition scenario it is difficult to select, monitor and evaluate the programme activities and projects, but without doing these projects and programme activities, it is difficult to formulate an appropriate scenario. This makes scenario development an important instrument within programme management, and the resulting transition scenarios an important output.

Such scenarios have several functions in governance literature about sustainability, transitions and innovation systems. Most importantly they offer a 'Leitbild' (Grin 2006): a shared mental image of an attainable future shared by different actors that guides the action of and interaction between these actors (i.e. the process of change). This Leitbild may be able to coordinate new actor-networks in the absence of strong institutions. A scenario helps selecting and orienting short-term interventions in line with long-term ambitions. This helps to discriminate between more and less relevant innovation processes, focuses resources and guides the search process in innovation processes (Hekkert et al 2007). Apart from distributing existing resources, visions may also be instrumental for marshalling new resources. This includes motivating new actors to engage with a transition process and gain support by influential actors or the larger public. Furthermore they require thinking through system change on an aggregated level in the long term. In this process of

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[9] As such the term is used more broadly than described by for instance Sondeijker (2009) who reserves the term for particular scenario-development activities or Loorbach (2007) who uses the term to refer to a particular sphere of transition management activities.

scenario building, larger trends and structural changes are identified that form relevant barriers and opportunities for innovations (Smith et al 2005). Transition scenarios are inherently normative, because they describe how sustainability and change are framed and who stands to gain and lose out in the proposed transition. This means they can also invoke negative reactions (Smith et al 2005).

Different actors can have different transition scenario's and given the complex nature of transitions these scenarios are expected to change over time as a result of learning and exogenous developments. Smith et al. (2005, p.1507) note that "*The process of transformation itself can force revisions to a [scenario]. Indeed, the original [scenario] may be relatively vague and incoherent: simply an orientation or framing of the problem, around which coalitions can begin to form. It is the process of system innovation that can give it shape and solidity in terms of an envisaged configuration of artefacts and practices that work in a desired way and deliver certain expectations*."

At the same time, scenario development is sparsely addressed in programme monitoring and evaluation. This may be the case because scenario development and evaluation are usually considered to be disconnected in time: defining problems, visions and plans at the start of a programme as part of strategy development and evaluation at the end. When dealing with complex problems however, strategy making, implementation, monitoring and evaluation become recursive and continuous processes (see also the transition management cycle as developed in Loorbach 2007, 2010). In system change programmes it therefore makes sense to also include scenario development in the monitoring and evaluation process.

Foresight activities like developing a transition scenario have increasingly become activities in which not (only) experts, but also market and societal actors are included. Currently there is a trend in which foresight moves away from being a single, central activity (like in national foresight programmes) towards an activity that is distributed in the science and innovation system where multiple organisations conduct foresight specific to their own needs but with a level of coordination (Georghiou and Keenan 2005). Participatory approaches to scenario development have the benefit that individual perspectives become articulated and room is created for shared problem perceptions. If the resulting scenarios are inspiring and innovative they help to stretch stakeholders thinking, offering a starting point for second order and social learning (Sondeijker 2006).

Problem framing, plans and visions may be formulated at different scales: shorter term , local transition scenarios for transition experiments and national scenarios across several generations at the strategic level. We may speak of a transition scenario within a local innovation project and a transition scenario implicit in the discourse of an entire sector. Transition scenarios help frame which changes and sustainability issues matter. Changing scenarios therefore not only indicate learning processes, but may also lead to new change and sustainability indicators.

DIMENSION 2: CHANGES IN CULTURE, STRUCTURE AND PRACTICES

Where transition scenarios refer to the expectations over a longer period of time, the change indicators refer to concrete , current changes in culture, structure and practices.

Following Giddens, structure and agency are two sides of the same coin. Structures enable and constrain agency and agency changes or reinforces structures. The term structure is used differently by different scholars. Based on Van der Brugge (van der Brugge 2009), the following operational definition is helpful. Structure includes physical structure

(artefacts, land use, built environment, tangible resources) and social structure (institutions, organizations and networks, regulations, norms, responsibilities, budgets and contracts). Culture refers to paradigms, discourse, values and the knowledge base. Dominant culture and structure are constantly recreated through routine practices.

Characteristic of transition programmes is that they are looking for *fundamental* changes in the dominant culture, structure and practices in the field they operate. This means that for example an experiment should not only be monitored with respect to structural changes they produce locally like the introduction of new technologies, business models and networks, but also in which aspects these technologies, business models and networks are fundamentally different from mainstream structures in a sector. Each level has different changes that are relevant for monitoring (see below).

DIMENSION 3: SUSTAINABILITY CRITERIA

Sustainability studies show that regardless of the importance of sustainable development, the concept inherently has normative, subjective and ambiguous elements. It involves a normative choice about what needs to be sustained and what needs to be changed. Because the same developments may be interpreted in different ways and because there is not always an objective ground to decide which particular interpretation of sustainability is 'better', choices are to some extent subjective and ambiguous (Rotmans and Van Asselt 1999). According to Weaver and Rotmans this does not do away with the possibility and relevance to seek a context-specific sustainability interpretation that is acceptable to a wide range of stakeholders (Weaver and Rotmans 2006). For many transition programmes it may not be clear from the outset what this sustainable interpretation is. In these cases monitoring sustainability is not straightforward, although it is expected that particular criteria will result from the learning process in the programme. After all: without a sustainability notion, it is unclear to what (societal) cause a transition should be pursued and how different innovations measure up to the challenge.

This is one of the reasons why there is no universally accepted set of sustainability criteria. There are hundreds of sets of sustainability criteria for different products, regions, policies, actors, etc. Parris and Kates (2003) reviewed 12 prominent examples and concluded that there are no indicator sets that are "*universally accepted, backed by compelling theory, rigorous data collection and analysis, and influential in policy. This is due to the ambiguity of sustainable development, the plurality of purpose in characterizing and measuring sustainable development, and the confusion of terminology, data, and methods of measurement*". Sustainability criteria can both refer to quantitative criteria to judge changes ('project X produces 30% less waste than previous best practice'), but also to qualitative criteria used by actors (' according to actor A, project X is primarily about waste reduction, while Actor B stresses the opportunities it provides for providing new employment opportunities').

The quality of sustainability criteria needs to be ensured by the process through which they are generated (Parris and Kates 2003; Tuinstra et al. 2008). Those criteria should be chosen that are considered most valuable by programme stakeholders. Transition monitoring therefore has two functions: not only measuring the 'sustainability performance' of the transition field, projects, scenarios etc. but also stimulating the discussion about the sustainability norms at stake.

LEVEL 1: THE TRANSITION FIELD

One of the basic tenets of transition management is that the dynamics of the transition field create feasible and non-feasible means for steering and insight into how the system works is an essential precondition for effective management (Loorbach 2007). Programmes need to shape, embed and align their programmes to the transitional changes in the field they operate. The projects and programme activities themselves are a source of information how the programme can mediate, moderate and manipulate the external context and pressures (Pellegrinelli 2002).

An often used model to describe transition dynamics within transition research is the multi-level model (Rip and Kemp 1998). This model divides socio-technical systems into niches, regimes and a landscape. A transition is then defined as a fundamental regime change. Rotmans et al. (2001) propose that a transition takes place through four phases: a long predevelopment phase in which niches emerge and the regime slowly becomes maladapted to larger landscape developments, a take-off phase in which self-enforcing and large scale dynamics start to appear, an acceleration phase in which the change unfolds and a stabilisation phase in which the new regime enters a new dynamic equilibrium. Although the multi-level and phase model are the corner stone of transition research they offer limited guidance for indicator design. Both models do not describe 'what' changes in a transition. To illustrate: according to Geels (2004) the first two benefits of the concept of regime over the (also broad) concepts of sectoral innovation systems, technological systems and large technological systems: (i) regimes include to *both* the supply side (innovations) *and* the demand side (user environment) (ii) an analytic distinction between: systems (resources, material aspects), actors *and* rules and institutions (after which he gives an extensive list of all the different elements falling under these broad categories.

Since the development of these rather broad-stroked theories however, more specific theories have been developed that offer insight in particular patterns through which this multi-level and multi-phase change occurs. These theories are more useful for indicator design and interpretation. I will explain two of these theories in some greater detail as they are used with the transition monitoring of the gas system (see chapter 8) and Energy Innovation Agenda Energy (chapter 9). Other middle-range theories worth mentioning here are the transition patterns developed by Smith, Stirling et al. (2005), Geels and Schot (2007) and Van der Brugge (2009). For programmes with a specific focus on particular niches, the niche trajectories described by Levinthal (1998) and Geels (2005) and the emergence of niches themselves as a result of innovation projects described by Raven (2007) and Geels and Raven (2006) are interesting contributions. Because of their more specific focus these niche-theories are also applicable on programme and project levels. Also transition management ideas as proposed by Loorbach (2007) may be used to describe the interplay between long-term visions, new governance structures and experiments in the transition field.

Example 1: Monitoring transition patterns. De Haan and Rotmans (2011) add to the multi-level and multi-phase models by developing theoretical building blocks and concepts that describe the complex transition dynamics themselves. Following the multi-level model De Haan and Rotmans describe three conditions, stressors or driving forces (tension, stress and pressure) that act on the regime. These conditions result from a mismatch between the regime and landscape (tension), a mismatch between the way the regime actually operates and how regime players want it to operate (stress) and growing completion between a regime and niches that in some respect outperform these regimes (pressure). These conditions are necessary though not sufficient conditions for three types of change processes or transition patterns: reconstellation, adaptation and empowerment. In reconstellation the locus of change lies in the

landscape. For example when policy reform or ecological crises impose large scale changes on the regime. When changes are initiated by the regime, this results in adaptation. In adaption innovative niches are absorbed in the regime without changing it fundamentally or different regimes co-evolve. Empowerment refers to the scaling up of niches. Over time, a sequence of conditions and patterns results in a particular transition pathway. Based on this theory three types of indicators are requires: conditions indicators, transition pattern indicators and transition pathway indicators. Conditions indicators are likely to include sustainability indicators (ie depletion of resources at landscape level, resulting in a tension between regime and landscape), transition scenarios indicators (ie a large number of regime players advocating fundamental change indicates stress in the regime) and change indicators (ie landscape level demographic change driving a transition in healthcare). This has been worked out in detail for the transition dynamics in the Dutch Gas system in chapter 8.

Example 2: Monitoring innovation system functioning. Especially for new technological innovations, it is difficult to stimulate and understand the innovation process solely based on innovation-specific indicators like cost effectiveness, performance etc. Innovation systems theory therefore analyses the dynamics of the systems in which innovation takes place. Technological innovation results from the interplay between suppliers, consumers, policy makers, knowledge institutes and intermediaries. These so-called innovation systems can be defined at different levels: national innovation systems, sectoral innovation systems, regional innovation systems and technological innovation systems (Carlsson et al., 2002). Hekkert et al (2007) and Bergek et al (2008) have identified particular 'innovation systems functions' that can be used to understand and stimulate emerging technological innovation systems. These functions include entrepreneurial activities, generation of knowledge, market formation, guidance of the search etc. These functions can be monitored for programmes that want to further specific sustainable technologies by drawing up indicators for the various functions and their interaction. This has been worked out for the Innovation Agenda Energy (chapter 9). Programmes and projects may be monitored specifically in how they address hampering innovation system functions.

LEVEL 2: THE PROGRAMME

The programme level is the central and most important level in the monitoring framework. Within the level of transition programmes all cases use the distinction between strategic, tactical, operational and reflexive activities (projects) that forms the basis of transition management as described by Loorbach (2007, 2010). This framework has already been introduced in Chapter 1.

A transition programme consists of a portfolio of (strategic, tactical, operational and reflective) projects and a network of change agents. Portfolio management helps prioritize resources and realise synergies. Managing the network of programme managers, project leaders, strategic partners and others requires influencing: (1) the interaction within a network (brokering, mediating, activating networks etc.), (2) the social structure within the network, (3) governance structure (eg establishing an administrative organization) and (4) network-level (Kickert, Klijn et al. 1999, p.52). Creating a shared set of goals and vision (in the programme is therefore an important outcome of network management (Keast, Mandell et al. 2004).

Example 3: Monitoring a programme from transition management perspective. Transition management distinguishes strategic, tactical, operational and reflexive activities. Within the strategic activities, arenas play a central role. Arenas consist of a small group of 'fresh-thinkers and frontrunners' who develop a long-term transition scenario at system (eg sector or region) level, engage in systems analysis etc. This transition scenario is both intended to influence the expectations and framing of policy-makers and the public in general and set the stage for additional transition management activities. Arenas provide the long-term focus and societal relevance for tactical activities. Tactical activities negotiate structural room for change through agenda-setting, network development, etc. This room can be used to stimulate transition experiments at the operational level. The other way around, transition experiments may identify structural changes to be addressed in tactical activities and legitimize the need for tactical interventions. Monitoring is one of the reflexive activities to learn about and further develop the transition and transition management activities. Programmes may be analysed and monitored as a set of interdependent strategic, tactical and operational activities. At the programme level, this theoretical angle implies monitoring the development and interaction of these activities (change dimension). Another option is to monitor the alignment of the various transition scenarios at strategic, tactical and operational level (transition scenario dimension). A lack of alignment indicates a lack of common goals of the network and a lack of synergies in activities. Complete alignment indicates a sense of shared purpose but the lack of diversity may also pose the risk of 'group think' and leave the programme vulnerable in cases of unexpected failure and changes in the programme context. In terms of sustainability, it is about monitoring how and how much different activities contribute to shared sustainability values.

LEVEL 3: PROJECTS

Individual change agents will join a transition programme when they think it is an advantage. The primary advantages are access to financial resources and to political resources that bolster legitimacy and support. Information sharing and joined framing of issues and solutions are less important (Betsill and Bulkeley 2004). Apart from providing resources, programmes support individual projects and change agents by providing advice and the opportunity to develop competences. Active intervention by programme management is desirable when the programme realizes clear benefits for projects without reducing their flexibility. To be able to intervene, programmes need to be in the position and willing to exercise power and project leaders need to perceive that the programme effectively addresses their own priorities (Gray 1997). As most resources are allocated when projects are 'approved', programmes have the most leverage before final project approval, although some room to influence on-going activities generally remains.

Transition management literature offers guidance which competences, processes and results may be expected of individual transitional change agents and strategic, tactical or operational activities (eg van de Kerkhof and Wieczorek 2005; Loorbach 2007; Raven, van den Bosch - Ohlenschlager et al. 2007, Sondeijker (2009), Van den Bosch, 2010). Also other theoretical frameworks like Nooteboom's (1999) theory on knowledge development in innovation processes may be used to monitor individual projects. Some of these publications list criteria to judge the transitional character of projects. Such static descriptions may be more relevant for selecting than for monitoring projects unless programme and project managers aim to 'transitionize' their activities. An example of a dynamic theory to monitor the development of transition experiments which is worked out in chapter 6 is Van den Bosch's theory on deepening, broadening and scaling up (Van den Bosch 2010).

Example 4: Monitoring transition experiments. Based on literature on transitions and evolutionary perspectives on innovation**,** Van den Bosch (2010) describes how transition experiments contribute to a transition through mechanisms of deepening, broadening and scaling up. Deepening is a learning process through which actors learn as much as possible about a transition experiment within a specific context. Broadening is repeating a transition experiment in different contexts and linking it to other innovations. Scaling up is embedding a transition experiment in dominant ways of thinking (culture), doing (practices) and organizing (structure), at the level of a societal system (Van den Bosch 2010). In terms of the monitoring framework these three mechanisms may be monitored in all dimensions. For example in a process of deepening, transition scenarios are reflected upon and possibly modified, broadening can concern aligning and marketing the scenario within the own organization, peer groups or similar projects and scaling up the transition scenario occurs by anchoring the scenario within the sector at large.

Table 4.1 provides an overview of the transition studies mentioned and the level they are mostly applicable. As explained in chapter 3 those transition theories should be used that best match the programme that is monitored.

Table 4.1: Toolkit of selected transition studies

Name	***Key publications***	***Transition field***	***Programme***	***Projects***
Typologies of transition patterns	Smith, Stirling et al. (2005), Geels and Schot (2007), Van der Brugge (2008), De Haan and Rotmans (XX)	X		
Niche trajectories	Levinthal (1998) and Geels (2005)	X		
Niche trajectories and relation to innovation projects	Raven (2005), Raven and Geels (2006)	X	X	X
Innovation systems	Carlsson et al. (2002), Hekkert et al (2007) and Bergek et al (2008)	X	X	X
Transition management	Loorbach (2007, 2010)	X	X	X
Individual strategic, tactical and operational activities	Van de Kerkhof and Wieczorek (2005); Loorbach (2007); Raven, van den Bosch - Ohlenschlager et al. (2007), Sondeijker (2009), Van den Bosch, 2010)			X

4.2 PROGRAMME STRATEGIES

Transition management literature tends to define transition strategies by a critique on conventional planning and emphasizes continuous learning, uncertainties and the resulting 'messiness' of strategy. To guide transition monitoring however, a description of strategy is needed that focuses on more or less predictable patterns. This section therefore describes programme strategies based on the strategy typology developed by Wiltbank, Dew et al (2006) on entrepreneurship and business strategy. They, in turn, have based their typology on an extensive review of literature on strategy. Different strategies have different implications for monitoring. Wiltbank, Dew et al. distinguish planning, adaptive, visionary and transformative strategies. These strategies differ in two dimensions: whether the environment (e.g. a market or a societal system) can be predicted and whether it can be influenced. They argue that these

dimensions are independent. An actor may be able to control his environment without being able to predict it, while other actors may view their environment as predictable but beyond their span of control.

First planning and adaptive strategies including their monitoring implications are discussed. These strategies approach the environment as something that cannot be influenced, or as exogenous. This does not correspond with the experiences in the pilot programmes (chapter 3), nor with transition literature. Transition programmes do not aim to survive in an exogenous environment by adapting to it or planning towards an optimal position, they want to fundamentally change this environment. However the planning and adaptive strategies form a reference point to better understand the special monitoring implications of visionary and transformative strategies. These two strategies are more suitable to describe transition programme strategies and will be described next.

PLANNING STRATEGIES

Programmes with planning strategies first analyse the environment to predict as best as possible what will happen there. Based on this prediction, a strategy for an optimal positioning in this environment is developed. When the desired position in this predictable but uncontrollable environment is determined, appropriate objectives are formulated and planning activities and developing lower level performance targets can start in a top down fashion. After the dynamics in the environment and the desired position have been determined, monitoring focuses on whether activities are executed as planned and targets are met. In parallel, it is checked whether the environment develops as predicted. There are two types of planning strategies; full planning and result based management. Full planning programmes depart from a comprehensive plan that describes in detail the objectives and the way through which these objectives should be realized. This type of programme is likely to treat sustainability transitions as structured problems for which an optimal strategy can be defined from the outset. The programme translates this plan to more specific project plans. This type of top-down planning considerably constrains the freedom of the programme and its projects to find the most optimal way to realize given objectives.

Result-based management may well be the most common type of programme strategy. Results-based management has a management and monitoring structure that defines a top-down hierarchy of objectives in which global objectives at the higher level are de-composed into more specific objectives at lower levels. Managing these programmes requires monitoring whether the agreed objectives are achieved but leaves the decision on how to achieve these objectives to lower level projects and activities. A typical result-based innovation programme would focus on a single (sustainability) indicator like an agreed percentage of CO_2 emission reduction and less on the social and technical change that needs to take place to realize such a target. Because only partial consensus is needed regarding the goals and no consensus in the ways to attain them, this implies a semi-structured problem definition. In both variants, planning strategies imply that analysis of the environment is essentially one-off as a preparation for the planning process and takes place prior to (and separated from) monitoring the programme activities and projects which are conducted to control that agreed goals and activities are realized.

Examples of planning strategies include most conventional project proposals in which deliverables and milestones are set before the project starts (full planning), energy policies that are strongly based on predictive models of future energy systems (full planning) and environmental policy programmes in which the realization of policy goals is left to stakeholders on the basis of for example agreements between the government and sector representatives (result-based

management). In these examples monitoring is based on whether the plans and roadmaps develop as expected and predefined results are met. Because the focus is on planned activities, this type of strategy may be suboptimal for innovative activities in an uncertain environment such as transition programmes. According to Duret et al (2009) this type of strategy is even in contradiction to the very reason why innovation programmes are supported by governments. They argue that the lack of predictability as a result of uncertainties leads to market failure and is an argument for government intervention. Nevertheless, in their review of articles on business strategy, Wiltbank et al (2006) highlight that, according to some researchers, planning strategies can also be successful in uncertain environments, because disciplined and detailed planning work better than intuition and heuristic, even if the resulting predictions are inaccurate.

ADAPTIVE STRATEGIES

Adaptive strategies start from the premise that the future state of the environment is not only impossible to influence, but can also not be predicted. An adaptive strategy means moving as fast as possible to adapt to a changing environment. This requires building and maintaining agility through constant information on changes in the environment, for example, by joining many different networks and actively monitoring early signs of change. Such a strategy can be found in programmes that primarily see themselves as a support structure for individual projects. Pursuing diverse activities helps to signal changes early and keep options open (Stirling, 1998). The focus for monitoring is on the environment to be able to quickly respond to changing programme management requirements. Rather than articulating specific programme level objectives and aligning the projects to these, they take the problem definitions from the project as a starting point to develop appropriate ways of supporting them. Examples of adaptive programmes are adaptive ecosystem management programmes where elaborate monitoring systems are in place to be able to quickly anticipate and adapt to non-linear ecosystem changes and community support programmes that try to facilitate all types of local initiatives. Programmes of this type support individual projects and activities, but may have trouble to develop a transition scenario at programme level. This makes it difficult to coordinate projects and influence strategic partners in order to deliberately influence larger transition dynamics.

VISIONARY STRATEGIES

A visionary programme ‘starts from a vision of what a valuable future would be and then tries to shape the environment in order to realize it. This vision is not just for programme-internal use but has an important function to motivate other actors to contribute to this vision and change their expectations of the future. In an uncertain environment such a shaping strategy or organizing vision (Burton Swanson and Ramiller 1997) includes building credible visions to coordinate the strategies of different players and setting and building standards (Courtney, Kirkland et al. 1997): the strategic and tactical activities in transition management. On the operational level, different alternatives are tested in current systems to quickly learn from the responses to these alternatives (Hamel and Prahalad 1991). Over time social learning about the programmes activities and changes in the transition field may lead to revisions in the vision. Many of the examples of transition management fit this strategy, including the different platforms in the Dutch energy transition initiative (see for example Loorbach 2007, Kemp and Rotmans, 2007, Hendriks 2008, Kern and Smith 2008). Monitoring focuses on whether visions are adopted by other actors to coordinate their action and what type of information experiments yield on the possibility of making the vision come true. The simultaneous acknowledgement that it is

impossible to control and predict transitions while still attempting to influence a societal system by developing and communicating visions, is typical for this type of strategy (Sarasvathy 2001), but can lead to misunderstandings that transition management is a strong type of social engineering as put forward by (Duineveld, Beunen et al. 2007).

TRANSFORMATIVE STRATEGIES

In a transformative programme, knowing what to do is not based on a programme plan, vision or adapting to the environment. Transformative strategies start with what you can do: what the identity of the programme is, what you know and whom you know (Sarasvathy 2001). Based on these means, a programme can take a next step, which requires commitments of new stakeholders. Through every step increasing knowledge is gained, networks are created and tightened and a stronger sense of identity is constructed. This provides increasing means and, as more commitments are made, converging goals. This way, "*current means are transformed into co-created goals with others who commit to building a possible future*" (Wiltbank, Dew et al. 2006). Examples are community-based programmes in which goals are created in the process of involving new actors and carrying out projects and transition programmes that start with developing an innovative portfolio and network. These programmes learn through this process what type of structural change is necessary and what kind of transition is desirable and possible, which, in turn, leads to involving new actors and projects. The eventual transition scenario will be contingent on the first stakeholders and activities in the programme. Monitoring in such a programme focuses on the development of means (knowledge and competence, network development, programme identity), the development of converging goals and continuous identification of new knowledge, actors, developments and activities that are relevant to the programme in the context of the current means and evolving goals.

MONITORING IMPLICATIONS OF VISIONARY AND TRANSFORMATIVE STRATEGIES

In the introductory chapter sustainability transitions were framed as an unstructured problem. This problem is unstructured, because there is no consensus on both the result of a transition process and the ways to influence this process. A visionary or transformative strategy are similarly based on an unstructured problem definition in which both programme-level goals and means change over time leading to a more structured problem definition as the programme matures. Both a transformative and a visionary strategy do not require a highly detailed plan in which goals and means are given at the start of the programme. Given a rough idea of a desired situation, these strategies may however *result* in increasingly well-defined plans along with new means and opportunities to shape the environment. Shaping the environment requires understanding how to influence it and this understanding is based on evolving means and goals. Goals, means and opportunities are closely related, co-evolve, and depend on the specific framing of a situation by a specific change agent (Sarason, Dean et al. 2006).

The way that the problem (which transition to pursue and how it should be pursued) becomes structured differs in the two strategies. A visionary strategy starts from a broad idea of the desired transition and works towards innovative and sustainable activities that fit this vision. It requires monitoring which options are most promising to realize the vision and how the current societal context can be interpreted and shaped for them to become successful. A transformative strategy starts from innovative and sustainable experiments and builds a vision from these experiments. It requires monitoring how goals emerge, what this means in terms of the combined resources, which additional activities and actors need to be enrolled and which structures and long term visions may be developed to create larger scale changes.

Both transformative and visionary strategies imply that monitoring necessarily concerns both programme internal and programme external developments and that these define each other. New developments within the programme identify relevant developments outside the programme and vice versa. Vague objectives, initially non-existent, inconsistent, or changing methods and a lack of information require an adaptive type of monitoring that "*iteratively refines the monitoring design as (…) a result of experience in implementing the program, assessing its results, and interaction with users*." (Ringold, Mulder et al. 1999). In the remainder of this study we will focus on transition programmes that follow a visionary and transformative strategy as these seem particularly relevant.

4.3 PROGRAMME PHASES

Visionary programmes and transformative programmes have a different approach to structure the problem which transition to pursue and how it should be pursued. As they start the problem structuring process from a different position, they will encounter different programme development issues -and therefore have different monitoring needs- over time. There is little research into the typical dynamics in which these programmes develop and therefore which monitoring needs to expect.

A starting point to describing and understanding the dynamics over time is the general programme cycle developed by Thiry (2004). Thiry proposes a programme cycle that consists of five phases: (1) formulation, (2) organization, (3) deployment and (4) appraisal. After several such cycles the programme enters a phase of programme dissolution (5).

In the formulation phase, the programme strategy is formulated. This is a sense-making process in which the needs and expectations of the initiators of a programme are identified and prioritized. Based on these needs, different courses of action are formulated and evaluated. After deciding on the purpose and critical success factors of the programme and after securing approval and support the programme enters the second phase. In this phase, the organization phase, a programme develops a strategic plan and selects actions and projects. Choices about the organization are part of the strategic plan. The third phase is the deployment phase. The focus is on execution and control of projects and other programme activities. The role of programme managers in this phase is the continuous assessment and management of the programme context to monitor changing needs and expectations and emerging insights. The contribution of projects to programme level goals needs to be monitored corresponding decisions to add, stop or connect projects made. The appraisal phase is seen as a relatively stable phase, in which programme management more fundamentally reassesses the set-up, progress and context of the programme. This may lead to a new programme management cycle or to programme dissolution. Programme dissolution is needed when (1) the initial goals have been achieved and the programme is no longer necessary, (2) when the costs outweigh the benefits that the programme realizes, (3) when the environment has changed, making the purpose of the programme no longer relevant or (4) when the results of the first cycle show that the programme's ultimate purpose cannot be realized (Thiry, 2004). When programmes go through multiple cycles, activities like the formulation of strategy, become recurrent themes that need to be monitored.

These phases match the experience with the five transition programmes in the pilot-phase. They are the result of requirements set by programme commissioners. Programme commissioners generally require a strategy document for a programme, provide a budget and starting date, demand programme appraisal at a particular time and often also

determine the date of programme resolution in advance. The stricter these requirements, the more pronounced the phases will be. Therefore these phases will occur regardless of the strategy (visionary or transformative) chosen by programme managers. The programme cycle model can be used to develop a typical sequence of programme development issues for each strategy. Anticipating the programme development issues for both transformative and visionary strategies in each phase can provide focus to the monitoring activities and help to ensure that the monitoring results and resulting steering suggestions become available at a time when the programme has the opportunity to implement them.

4.4 MODES OF MONITORING

In chapters 1 and 2 transition monitoring was presented as a process of co-production by researchers and programme managers. Chapter 1 showed that researchers in transition theory and evaluation researchers value co-production as an appropriate method of knowledge production to deal with the complex changes and unstructured problems transition programmes are working on. Chapter 2 further elaborated rationales for co-production related to enhanced instrumental (management) value of monitoring findings, the advantages of combining different forms knowledge including scientific and practical knowledge and enhancing the legitimacy of the monitoring process and results. However, the pilots in chapter 3 showed that transition monitoring is framed differently by different programme managers and that the actual process of co-production was sometimes problematic. This issue is of major importance if monitoring activities are to be both meaningful with respect to individual programme strategies (section 4.1) and transition theory (section 4.2).

In processes of co-production, transition monitoring serves as a boundary object (Cash and Clark 2003) in science-practice interaction. Boundary objects facilitate discussions in which different types of knowledge are communicated, viewpoints are translated so they can be understood by others, and conflicts are mediated. This contributes to effective knowledge systems (Cash, Clark et al. 2003). Co-production of the monitoring approach is therefore not only a process in which monitoring information is collected and interpreted, but also an opportunity for transition experts to learn about programme management and for programme managers about transition studies, to the benefit of both.

A range of stakeholders may be involved in monitoring. A stakeholders can be defined as someone involved in, affected by, knowledgeable of, or having relevant expertise or experience on the programme and transition at stake (based on Van Asselt and Rijkens-Klomp 2002). Fully participatory monitoring would therefore include at least all project leaders, programme managers and programme commissioners. In all likelihood the number of views, interests and values will increase when more stakeholders are included in the monitoring team. As mentioned transition monitoring is not necessarily fully participatory Full participation of all stakeholders is not always practical, possible and useful (Sullivan, 2006).

There are different rationales for including more stakeholders. Fiorino (1990) points to three rationales for stakeholder involvement, closely resonating the earlier mentioned rationales for co-production (chapter 2). The first is the substantive rationale: co-production might benefit from including more diverse and relevant knowledge. Project leaders, commissioners, people from the board, etc. are all experts on different parts of the programme and therefore may all have relevant expertise to contribute. For example without including the project leader in assessing a project's relevance and progress, judgments may only be based on indicators that by necessity only highlight a small part of the bigger

picture. This can lead to a range of perverse incentives and wrong conclusions (De Bruijn, 2002). The second is the normative rationale: as stakeholders are affected by the programme, they should be entitled to have a voice in monitoring it and in the subsequent recommendations. The third rationale is the instrumental rationale. Stakeholders are more likely to use the outcomes if they have been involved in the monitoring process. This is about more than generating support for transition monitoring and its findings. An important effect of transition monitoring is that by taking part in the choices what to monitor and how to do it, by being involved in data collection and by interpreting the results, participants may learn more about the programme and its role in the transition process. More participatory monitoring may not only bring benefits. It may also become more time-consuming, more difficult to organize, include more strategic game playing and empowering others may be at the expense of the legitimate role of programme managers to manage the programme.

The advantages of including more people in the monitoring process come from the inclusion of diverse perspectives in the monitoring process. These diverse perspectives are expected to bring more knowledge, diverse values and more support for findings. Many monitoring approaches, including participatory approaches which advocate this diversity, are heavily based on consensus: consensus about the programme strategy, its goals, expected developments, etc. This has two important drawbacks as described by Guijt (2004). The first is that stakeholders may not have sufficient time, expertise, clarity and willingness to reach agreement on the necessary indicators. In the pilot cases this resulted in extensive discussions, but little time left to do adequate data collection. The second is that the focus on consensus as a way to deal with diversity among stakeholders 'effectively eliminates diversity' (Guijt, 2004, p. 297). In the next paragraph we will try to come up with another way of dealing with diversity by defining two types of appraisal in which diversity is not so much viewed as an input to the monitoring process but rather as a result. These types of appraisal are referred to as opening up and closing down. Later in this section, opening up and closing down will be connected to different types of science-policy interaction.

OPENING-UP VERSUS CLOSING DOWN

Evaluation researchers, including those in the field of system innovation and transitions, typically refer to the long-term debate on whether evaluation should be primarily used as an instrument for measurement or for (social) reflection. The traditional view of monitoring and evaluation is measuring whether an intervention has the desired effect. As the saying goes: what gets measured, gets accounted for. An important question is therefore whose desired effects are at stake in an evaluation. For many social interventions this is not straightforward and according to Guba and Lincoln (1989) a key function of evaluation should be to discuss different claims, concerns and issues regarding an intervention among stakeholders. In addition, researchers in system innovation stress that sustainability problems cannot be solved by the same thinking that created these problems and that reflection is therefore essential. In practice, both measurement and reflection are necessary (Regeer, 2009). We will approach this debate by distinguishing two forms of appraisal of on-going developments: opening up and closing down. Closing down provides information based on a single framing, opening-up presents different ways to frame on-going developments that may challenge prevailing framings of the situation. Monitoring can be used for both opening up and closing down and both processes are necessary for transition programmes (Smith, Stirling et al. 2005; Voss, Bauknecht et al. 2006; Smith and Stirling 2007).

Opening up and closing down can be done both through expert analysis and through participation: it refers to the findings of monitoring and not the input, like how many stakeholders are involved (Stirling 2008). The two processes of problem-handling form a paradox for reflexive governance (Voss, Bauknecht et al. 2006): on the one hand opening-up the range of information to new options and perspectives is needed to avoid tunnel vision (Duret, Martin et al. 1999), improve decision-making by including more alternatives, stimulate societal robustness and improve resilience to unexpected developments (Gerrits 2008). On the other hand, closing-down is required to reduce complexities, focus resources and attention, and facilitate action (Voss, Bauknecht et al., 2006).

The wrong type of monitoring may be counterproductive. At times when transition management calls for closing down, monitoring which opens up the process may hinder the focus and commitment to an agreed line of action. The other way around, when a situation is perceived as highly complex, monitoring a 'perspective turned into indicators' can turn in a 'paper reality' in which there seems to be consensus and clarity on paper, while there are actually different views and ambiguity. Determining what type of monitoring is required is an empirical question and depends on issues like the phase in the network building process, whether an issue is constructed as complex, complicated or simple, the specific purpose of monitoring and the relation to other sources of information.

MONITORING IN A PROCESS OF CLOSING DOWN

Monitoring stimulates a process of closing down when it makes a single framing of the situation measurable with indicators, cutting through the prevalent ambiguity and divergent possible framings. Closing-down reduces complexity, focuses resources and attention, and facilitates action. Such a "perspective-turned into indicators" leads to increasing structuration of a situation. The potential benefits of this increased structuring are transparency, an incentive for specific actions and outputs and shaping accountability (de Bruijn 2002). It provides feedback on whether an employed strategy works in the sense that it delivers intended outcomes in intended ways. In an analytical approach it stimulates more precise articulation of a perspective and can bring taken-for-granted assumptions or ambiguities in strategy to light by making them explicit. In participatory approaches to monitoring, the development of indicators can be used to develop a joint understanding of a situation and ownership of an intervention (Abbot and Guijt 1998). Development of arguments-turned-into-indicators can thus offer the potential of closing down on lines of action that are congruent with individual perspectives and bolster commitment. Because the output of this type of monitoring presents information from a single, coherent action frame, it produces information that can be easily interpreted and translated in a straightforward manner into recommendations for intervention. Reflection is stimulated during the design of indicators in making a perspective operational and when monitoring continuously signals that things aren't proceeding as expected. Typically the programme's transition scenario will be central and translated into change indicators and sustainability indicators on the transition field and individual activities. Monitoring focuses on expected outcomes from individual activities, whether previously identified bottlenecks in the transition field are removed and drivers enabled and the progress of the desired transition. In closing-down, monitoring starts from the programme level that determines which developments of individual activities and the transition field are relevant, corresponding to an 'inside-out' logic, meaning that the activities and transition field are viewed from the transition scenario of the programme.

The majority of monitoring approaches close down the range of information, especially in planning-based approaches. Examples are performance monitoring (closing down on what constitutes performance), regular project or plan

monitoring (closing down on a single interpretation of what the project is to do), auditing of negotiated agreements in policy and business based on a limited number of parameters, like the Milennium Goals, etc.

Transition programmes may benefit from closing down, but the type of governance and the complexity of bringing about a transition imply that closing down may not always be possible or even desirable. For unstructured problems the problem description and solution are interdependent and the information needed to describe the problem depends on specific framing of the situation (Rittel and Webber 1973). To give a simple example: monitoring the sustainability of the energy system in terms of fossil fuel consumption would exclude the solution of Carbon Capture and Sequestration (CCS), while monitoring it in CO_2 emissions would not (Meadowcroft 2009) and monitoring transition management in terms of its inclusion of niche payers leads to a different type of steering suggestions than monitoring it in terms of transaction costs. Treating a (partially) unstructured problem as a more simple, structured problem has the tendency to exclude relevant issues and perspectives of stakeholders and lead to suboptimal or even perverse results (Hisschemöller 1993).

More than in markets or hierarchies, change agents in networks can have competing definitions on goals and products. The interpretation and use of monitoring results might therefore differ between stakeholders. In situations with competing definitions and interpretations, non-standardized processes and many different uses of monitoring information (performance) monitoring can lead to perverse effects. These include game playing, adding to internal bureaucracy, blocking innovations and ambitions, reducing the sense of personal responsibility for the whole system and 'performing to the grade' (de Bruijn 2002). Or as Van der Knaap (2004) argues "*it is difficult to underestimate the simplifying effect of a policy theory and the effect of measurability and monitoring. Where too much emphasis is placed on theoretical causality and measurability, this may lead to tunnel vision, rigidity and fear of innovation*". In a study on an innovative insurance network, Sydow (2004) concludes that evaluation that closes down can have both positive and negative effects in networks depending on the stage of network formation. In a more stabilized network when the various perspectives are more aligned (or more clearly juxtaposed), closing-down monitoring is more beneficial. Strategies to prevent perverse effects are avoiding overdependence on indicators as the only source of information and promoting tailored use for specific purposes (de Bruijn 2002; Behn 2003).

MONITORING IN A PROCESS OF OPENING UP

Monitoring stimulates a process of opening up when it generates information flows that reveal different interpretations of the current situation. Opening-up requires seeing things differently or seeing different things. The knowledge gained by any description of a complex system is always relative to the perspective from which the description was made, although this does not mean that 'anything goes' (Cilliers 2005). Change agents are likely to frame the appropriate goals and means differently and a range of different descriptions are possible, some being given from positions of more power than others.

Opening-up can occur in all three monitoring dimensions. Opening-up in the dimension of transition scenarios requires the articulation and confrontation of different transition scenarios. Opening-up the dimension of changes in culture, structure and practices implies a focus on unexpected barriers and opportunities, weak signals, etc. that are new to the programme. Opening-up the sustainability dimension highlights sustainability issues that are unanticipated or perceived

differently by stakeholders. Opening-up systematically identifies new ways of thinking about the programme, projects and transition field, and may identify new change agents, activities and opportunities. Recommendations are presented as a range of options to pursue new lines of action. Based upon the different interpretations, programme managers can redefine their role and reflect on their own perspective. Such reflection is especially valuable during periods of formulation of strategy and programme appraisal. When closing-down is described as 'perspectives turned into indicators', opening-up is more like 'perspectives as indicators' or 'indicators on different perspectives'.

Although not as frequently used as 'closing-down' monitoring, monitoring for opening-up is far from exotic. It may be done under a different name like regular strategy sessions, business updates, involvement in different innovative networks, etc. Monitoring approaches developed for opening-up include reflexive process monitoring (van Mierlo, Arkesteijn et al. 2010), Interactive Learning Agendas (Regeer,Hoes et al 2009), the most significant change approach (Davies 1998; Dart and Davies 2003), fourth generation evaluation (Guba and Lincoln 1990) and the Protee approach (Duret, Martin et al. 1999).

An overemphasis on opening up may lead to never ceasing discussions about what the problem is, what role transition management should play in this and so on, which drains away the energy that can be spent on probing interesting alternatives for sustainability transitions. Without commitment to particular lines of action, transition management would also rob itself of the opportunity to learn from these actions. Such experiential learning would result in new opportunities for opening up, while shared experience may stimulate a converging frame by the involved actors.

This distinction between opening-up and closing-down also has implications for the roles of programme managers and transition experts in the monitoring process. This will be explained by looking at Hoppe's typology of co-production.

HOPPE'S TYPOLOGY OF CO-PRODUCTION

Focusing on the contribution of science to policy, Hoppe (2005) developed a typology of co-production which is rooted in conceptions from philosophy and social (public policy) sciences. This typology is based on the idea that scientists and policy-makers who engage in co-production do not do so without any preconceived ideas: they draw upon a reservoir of rules and expectations that correspond to more conventional roles of policy makers and researchers. This corresponds with the experience in the pilot studies where programme managers framed transition monitoring differently. In the next paragraph, Hoppe's typology is described and translated to the context of transition monitoring. Later in this chapter, the typology will be modified resulting in different modes of transition monitoring.

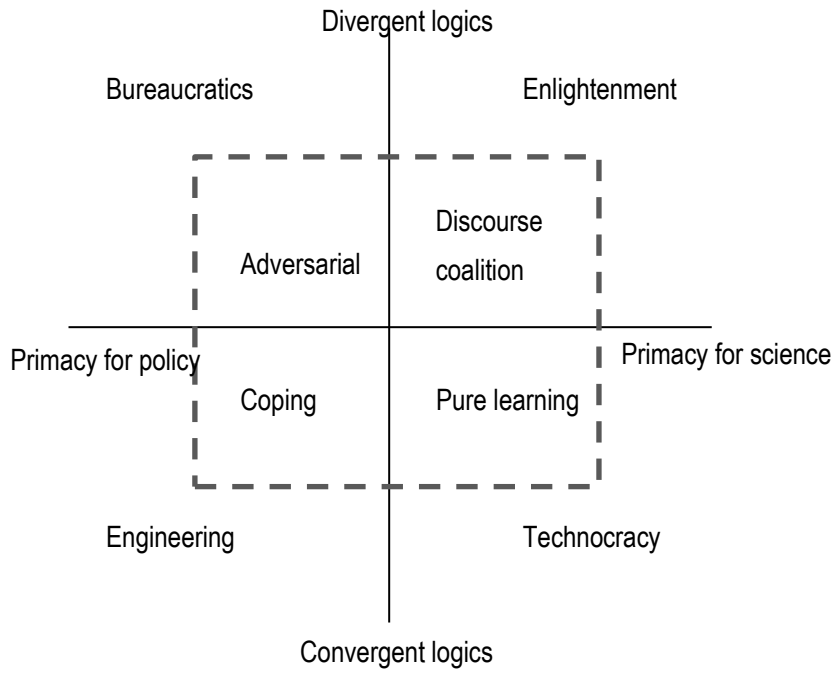

Figure 4.1: Hoppe's typology of co-production between scientists and policy makers

Hoppe's typology (figure 4.1) is based on two axes: whether science or policy is in the lead and whether they have divergent or convergent logics. In divergent logics science is only indirectly relevant for policy, whereas in similar logics, science can be used directly in policy. He positions four types of science-policy interaction at the extremes: bureaucracy, enlightenment, engineering and technocracy. These conceptualizations are well-described in different policy and public administration literature. At all four extremes there is little dialogue. For instance if science is in the lead, it speaks 'truth to power' either through scientific framing of policy problems which may trickle into the policy discourse (enlightenment) or by research that aims to describe objective and optimal policies that are adopted by policy makers (technocracy). In processes of co-production neither policy nor science is in full control and policy becomes dialogue. Hoppe defines four different types of co-production across the science-policy boundary as 'less extreme' versions of science-policy interaction. The four types are:

- Adversarial: based on Lindblom's view of policy-making as mutual partisan adjustment, policy making results from competition between different interest groups. Every interest group will look for expertise to bolster his political stance. Policy makers and experts all act as advocates for a particular stance.
- Discourse coalitions: interaction between researchers and policy-makers shapes the policy discourse around a central storyline, rhetorical style or concept representing a particular problem definition. An example is the development of the transition discourse in the Dutch energy transition (Kemp and Rotmans, 2009).
- Pure learning: in this model of co-production, policy makers and researchers have shared concepts and strategies. Policy is treated as a kind of research where policy is based on a set of hypotheses (the policy theory) and policy implementation is a means of social experimentation. Research provides empirical feedback whether policy theories are accurate.

- Coping: to tackle policy problems, policymakers and others primarily rely on common sense and knowledge of local circumstances, but from time to time also allow input from researchers. Problem solving is a continuous and trial-and-error process.

The four quadrants also resemble different strands of evaluation literature about the interaction between evaluation experts and policy makers. The idea of evaluation as shaping the discourse of policy through enlightenment often attributed to Weiss (1998), resembles the discourse coalition view of science-policy interaction. Evaluations which evaluate the credibility of policy theories and goal attainment can be positioned in the pure learning/technocracy quadrant. The adversarial model may view programmes as heterogeneous groups of stakeholders who perceive the programme differently and negotiate and interact with each other over its issues, positive effects and concerns. This closely resembles fourth generation evaluation (Guba and Lincoln, 1990).

MODES OF TRANSITION MONITORING

Transition monitoring is a process in which monitoring teams of programme managers and transition experts discuss the general programme and conduct focused data collection. It is a process of co-production. Preliminary applications of the approach encountered differences in ways the process and purpose of co-production were perceived in the monitoring teams (see chapter 3).

The typology of boundary arrangements in the science policy interface developed by Hoppe (2005) offers the starting point. His axis of converging versus divergent logics is replaced by the similar distinction between closing down and opening up. The axis primacy of policy versus primacy of science is replaced by monitoring as an internal programme activity or as external to the programme.

Internal modes of monitoring develop local knowledge *in* a programme, whereas external modes focus on knowledge *of* the programme. Internal modes stress monitoring as a process of (inter-) action whereas external modes stress monitoring as a process of observation. For internal monitoring (compare: governance on the inside (Smith and Stirling 2007)) the monitoring team participates in the inter-subjective negotiations on the framing of the programme and the transition field. Involved external parties (like transition researchers, professional evaluators, etc.) act as a member of the programme or independent facilitator. In external modes, the expert acts more as an independent advisor that tests programme theories or tries to enlighten programme management by offering a different (theoretical) perspective on the programme or transition field. The expert translates the framework in theoretical terms close to his expertise, even though the process of co-production still requires interaction with programme management. One way to facilitate communication during co-production is to focus in the discussion on indicators that make sense to both experts and programme management, even though each interprets the indicators through a different (theoretical) frame.

FOUR MODES OF MONITORING

The four different modes of monitoring are presented in the typology in figure 4. Transition monitoring is a process of learning-in-action and takes place in co-production. Moving too far left or right along the x-axis, monitoring becomes purely internal or external and thus no longer a process of co-production. Learning-in-action requires a continuous interplay between reflection and action. Moving too far up or down the y-axis, monitoring is no longer an instrument for

reflexive governance, but passive deliberation or pure routine. This means that all four modes are intermediary forms of monitoring, positioned between purely internal or external and between purely opening-up or closing-down.

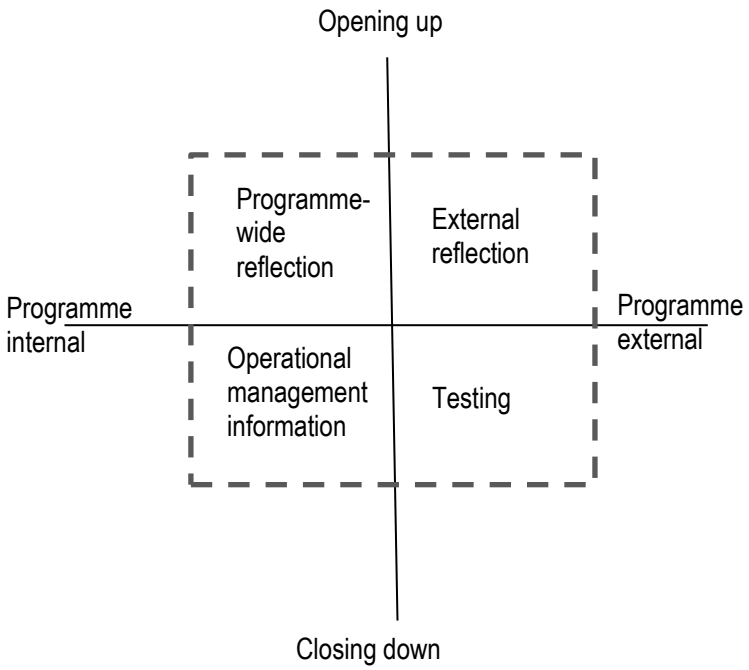

Figure 4.2 Typology of the different modes of monitoring

In **programme-wide reflection,** transition monitoring is an instrument for reflection by programme management, strategic partners , project leaders and (possibly) actors outside the programme. When the full range of stakeholders is included or represented, this becomes a form of participatory monitoring. These stakeholders learn about each other's views on the programme, projects and transition field through active involvement throughout the entire monitoring process. This learning through participation in the monitoring process is at least as important as the monitoring findings. This mode is a programme-internal activity because the aim is to stimulate the internal learning process within and throughout the programme as opposed to an expert opinion of the programme. Early emphasis on consensus may impede the creation of useful and novel insights for programme management, while minority viewpoints increase the likelihood of identifying new and qualitatively superior viewpoints (Cuppen, 2012). More closely rooted in participatory and constructivist evaluation methodologies like fourth generation evaluation (Guba and Lincoln 1990), the quality of the monitoring should be assessed by looking at whether divergent views and stakeholders were included (including minority views) and discussed in a balanced and open dialogue.

In **external reflection** experts like external transition scientists, professional evaluators, etc. play an important role. Without co-production, external experts would act as fully objective and distant observers, but this may negatively influence the salience and learning potential for programme managers. The primary responsibility for the focus, the theoretical perspective and primary transition scenarios used, as well as their translation into indicators, data collection and analysis lies with the expert. The choice what to do with these results lies with programme management. Quality control depends to a larger degree on traditional scientific criteria (expert reputation, peer review, etc) or extended peer review (Funtowicz and Ravetz 1993).

In **testing** the transition scenario of programme managers, and not the external expert's is central (in contrast to external reflection). The role of external parties is to provide a transparent check to verify claims and promises of programme management. Extreme forms are traditional programme evaluation whether the expected impacts of the programme are achieved, or auditing, in which it is checked whether previously agreed inputs and outputs are delivered. However, as described in chapter 2, learning requires theory-based evaluation which makes it necessary to look at the connection between inputs, activities, outputs and outcomes. The programme theory needs to be discussed and clarified in dialogue with programme management to assure management relevance (closing down). Testing the programme theory is important in order to learn what works (and what doesn't) and to produce evidence to support the programme's claims. Care should be given to use monitoring and evaluation procedures that are suitable for transition programmes and that do not downplay the diversity and constrain the flexibility needed for the continuous development of plans and theories within a programme.

Operational management information means that transition monitoring becomes part of regular programme management. Monitoring experts and change agents work together to generate information flows that facilitate daily or regular decisions in programme management. Examples are tracking project development, deciding to include or exclude specific actors, developing an agenda for upcoming learning sessions, etc. In contrast to testing, the focus is more on shorter term developments and management relevance than on outcomes and methodological strength. Unlike programme-wide reflection, the management relevance is not the articulation, confrontation and questioning of different transition scenarios, but the production of action-ready management recommendations. A challenge is to develop a lightweight monitoring system that produces information to answer a wide range of day-to-day management issues, while knowing that using transition monitoring for too many different purposes may lead to perverse effects (de Bruijn 2002) or a lack of dedicated information (Behn 2003). When transition scenarios, sustainability criteria and desired actions and structural change are ambiguous, not only the results of the monitoring, but also the process of monitoring itself may offer an important learning experience for programme management.

4.5 EVALUATING THE PROGRAMME FIT

The pilots in chapter 3 indicated that different values, the degree to which steering suggestions are perceived as actionable and issues like transparency and reliability help explain why monitoring activities can become effective in a particular programme context. Given the aim of transition monitoring (designing a monitoring approach that is useful for programme managers to continuously develop and improve their programmes) we need to better understand how programme managers evaluate such issues. The programme manager's evaluation of the usefulness of transition monitoring is regarded as the main mechanism behind effective monitoring.

Point of departure is the review of Cash et al (2003) of knowledge systems for sustainable development. Cash et al (2003) highlight three criteria that influence the effectiveness (usefulness) of knowledge systems for sustainable development: credibility, salience and legitimacy. They define credibility as the scientific adequacy of the technical evidence and arguments produced. Salience is the relevance to the needs of decision makers and legitimacy refers to the perception that the knowledge production is respectful of stakeholders' divergent values and beliefs, unbiased, and fair in its treatment of opposing views and interests.

A monitoring approach may require trade-offs between credibility, salience and legitimacy. Parris and Kates (2003) reviewed sustainability indicator sets and concluded that none of them score high on every dimension. One of the examples is the ecological footprint. The ecological footprint (the resources we use divided by the earth's carrying capacity) is one of the few indicators in which independent reviews have been used to bolster credibility. However with regard to legitimacy the ecological footprint relies primarily on the advocacy of the researchers who developed the approach and indicators are chosen without a transparent process including different stakeholder perspectives. As a result salience relies on "*the ability of [the] authors to assess the policy market for their publication and then use media exposure as their primary means to influence decision making*". So what does it mean for transition monitoring to be credible, salient and legitimate?

CREDIBILITY

As a form of intervention-oriented (as opposed to purely descriptive or analytical) monitoring, the credibility of transition monitoring is determined by whether (1) the relation between the monitoring information and the underlying concepts is valid, (2) whether the measurement itself is accurate and reliable and (3) whether the monitoring process results in recommendations and reflection that contribute to the desired transformative change. The final credibility criterion is whether the previous three credibility issues are logically connected and balanced. For example an overemphasis on accurate and reliable measurement may lead to a focus on data that is easy to observe, but not necessarily the most relevant to understand what is happening and improve transition programmes. Too little emphasis on measurement on the other hand may lead to a lack of realism where theories and recommendations have too little or flawed feedback from what is actually happening. Monitoring that meets these criteria offers credible policy recommendations, but does not necessarily produce salient or legitimate information.

SALIENCE

The salience of transition monitoring should by definition be assessed from the frame of reference of the programme manager. Based on criticisms on the applicability of management research, Thomas and Tymon (1982) describe five key user needs:

- *Descriptive relevance*: whether the monitoring describes the empirical context as experienced by the change agent.
- *Goal relevance* or the extent to which recommendations and reflection refer to goals the change agent wishes to attain.
- *Operational validity* or the extent to which recommendations and reflection refer to matters the change agent can influence.
- *Non-obviousness*: whether monitoring is able to produce counter-intuitive, new information, questions and recommendations.
- *Timeliness*: whether monitoring provides information to change agents in time to deal with problems.

Transition monitoring should provide recommendations to programme management and stimulate reflection. In closing down processes learning results from monitoring whether developments take place as expected and the five criteria can be applied narrowly. In opening-up types of monitoring too narrow application may not be useful for stimulating reflection. Reflection in opening up after all includes the possibility of changing what the programme manager perceives as goals, opportunities for intervention and alternative descriptions that can work as eye-openers. Reflection may be stimulated more by information that initially does *not* have a perfect fit to the programme theory of programme management. This does not mean that any information that is not salient for recommendations is automatically salient for reflection. If, after time and discussion, the information still does not fit the framing of the change agent, this is a strong sign that no reflection has taken place and the information was therefore not salient for reflection. The relation between the frame of the change agent and salience brings us to the issue of legitimacy.

LEGITIMACY

Cash et al (2003) define legitimacy as the perception that the knowledge production is respectful of stakeholders' divergent values and beliefs, unbiased, and fair in its treatment of opposing views and interests. The definition of Cash et al explicitly acknowledges that there does not have to be a consensus about the key values of different stakeholders as long as monitoring is fair in its treatment of opposing views and interests. Mediation on these different interests is an important process in co-production.

The main stakeholders are the programme managers and the transition experts who make up the monitoring team. Their values and beliefs concern both the goal of a transition programme and the way they want to manage the programme. Especially in programme-wide reflection more stakeholders should be involved. The values regarding the goal of a transition programme include the sustainability issues to which the programme wants to contribute and the type of change process they consider valuable. For example, a researcher who frames programmes from a transition management perspective will value the importance of long-term visions. Values underlying programme management can be the importance of bottom-up learning. In the pilot in agriculture (see chapter 3) these values conflicted. The transitions researcher criticized the programme for a lack of vision, while programme management saw a vision as a result rather than a prerequisite of the programme. In this pilot the legitimacy of the transition monitoring was criticized because programme management did not feel that the monitoring treated these opposing views in a fair way.

4.6 SUMMARY: CHARACTERISTICS OF TRANSITION MONITORING

The previous sections explained different theories and concepts from transition studies, programme management and policy sciences in the context of transition monitoring. These sections lead to seven characteristics for transition monitoring.

1. TMon uses concepts and theories of transition studies appropriate for the programme to be monitored

One of the assumptions in this research is that basing transition monitoring on concepts and theories from transition studies offers added insight and managerial value for programme managers. Different concepts and theories may be used, depending on the levels and dimensions of concern, the expertise of the monitoring team and the programme in question.

2. TMon accommodates visionary and transformative strategies

Programmes develop through different phases and the information needs in each phase may differ. Visionary and transformative strategies imply that the short term steps or the long-term goals respectively are initially unknown, which presents a challenge for monitoring. Because of these initially unknown aspects and because of the aim to influence the programme's context with its projects, the programme's understanding of the context it operates in and its projects is recursive: through projects a programme learns more about its context, and by better understanding the programme context more is known about which projects need to be initiated.

3. TMon requires monitoring on different levels

Transition monitoring involves monitoring the transition field (the programme's context), the programme itself and its individual projects and activities. The aforementioned strategies imply that transition field monitoring, programme monitoring and project monitoring are interdependent.

4. TMon requires monitoring the developments in different dimensions

In transition programmes both plans and goals are expected to change over time and programme stakeholders cannot be assumed to agree on plans and goals. This means that the different and dynamic interpretations of plans and goals themselves become the focus of monitoring activities. This led to the definition of three dimensions of change: (1) transition scenarios, (2) changes in cultures structure and practices and (3) sustainability criteria.

5. TMon takes place in a process of co-production to which different modes apply

Four modes of monitoring have been identified. These mode differ in their goal (opening up or closing down the appraisal of developments) and relation to the programme (as an integral part of the programme or as a separate activity). Monitoring stimulates a process of closing down when it makes the framing of the programme manager (eg his transition scenario) measurable with indicators, thus cutting through the prevalent ambiguity and divergent possible framings. Monitoring stimulates a process of opening up when it generates information flows with the aim to identify different interpretations of the dynamics at the time. Each mode implies a different role for programme managers and transition experts.

6. TMon is a flexible monitoring approach

The dynamics of the programme and the complexity of transition processes imply that programme management is influenced by continuous learning and programme development. Due to this process, information needs are expected to change and develop over time. This requires that the monitoring approach is sufficiently flexible to accommodate these changes.

7. Monitoring appropriate for the programme context: credibility, salience and legitimacy

The main mechanisms behind effective transition monitoring are the programme manager's assessment of its credibility, salience and legitimacy. All three mechanisms need to be in place.

The resulting image of transition monitoring stresses that effective monitoring is always dependent on a specific context and viewpoint. In the absence of deterministic theories, worked out plans and a completely shared perspective of the stakeholders involved this means that transition monitoring cannot be viewed as a routine collection of data separate from its interpretation and management context, but as an intervention in itself, opening up or closing down the appraisal of on-going developments as a result of the difficulties to define unambiguously what is relevant, communication and discussion are an essential part of monitoring.

CHAPTER 5 THE TRANSITION MONITORING APPROACH

Programme manager: *"we spent the first year forging projects (...) these were all new projects, that this programme office realized by bringing together different actors, or we learnt that somebody had an idea and we started looking for the necessary actors and in the process these ideas of course changed gradually (..) let alone that we could say anything meaningful about a vision on sustainability or the transition challenge at that time (…) this resulted in a portfolio of some twenty projects (…) then came a period when we let the projects develop (…) then came a period when we said, "let's see whether these projects are real transition activities", because earlier this concept did not exist. In other words do these projects contribute to a sustainability transition in mobility and what does sustainable mobility mean? And what is the role of Transumo in this process? Are these the projects we really need? Are the right players involved? Should existing projects be changed? Then we started asking questions to project leaders, which set in motion a process in which some projects changed (..) while other projects said "we already agreed on the course of the projects and you may come to us with this nice transition story of yours, but we are right on track and will continue this course""*

Evaluator: "*So the programme only later started to look for a sustainability transition?"*

Programme manager "*No, let it be clear that we always have. After all our programme is called Transumo: transition to sustainable mobility"*

Interview with John Pommer, programme manager at Transumo on the development of the programme, March 2007

This quote reveals a paradox. It shows that it was not possible to define the mobility transition and the contribution of different projects to this transition (and thus the intended programme outcomes) at the start of the programme. However it would be misinformed to conclude from this that the programme was not purpose-driven and impossible to monitor and evaluate. The development of the programme was on-going and intended to be that way. It was based on a series of conscious choices based on a continuous flow of new insights and developments. At the root of these choices are fundamental evaluative and monitoring questions. These were different at different stages of the programme and dealt with the identification of innovative ideas and stakeholders, the cohesion of the portfolio, the transformation of existing projects and defining a desired sustainability transition. So although monitoring such a programme based on predefined goals is difficult, monitoring can still significantly enhance on-going programme *development*.

The transition monitoring (TMon) approach is developed to support learning-in-action in transition programmes through a process of co-production and by using transition theories (as presented in chapter 1).The resulting information and learning process is intended to help programme managers continuously develop and improve transition programmes. Most of the elements of the monitoring approach have already been introduced and defined in the previous chapters. This chapter summarizes the empirical lessons (chapter 3) and theoretical lessons (chapter 4) so far and as simple as possible. The monitoring approach will be implemented and tested in chapters 6-10.

The chapter is structured as follows. Section 5.1 describes the monitoring framework. Section 5.2 describes different modes of monitoring. The monitoring process is outlined in section 5.3.

5.1 MONITORING FRAMEWORK

At the root of the approach is a basic monitoring framework. In contrast to the logical framework approach which monitors linear causal chains and to performance measurement which monitors hierarchies of targets/outcomes, the TMon framework is based on monitoring on-going alignment between different levels and dimensions. The framework has three basic levels and dimensions of monitoring (see figure 5.1).

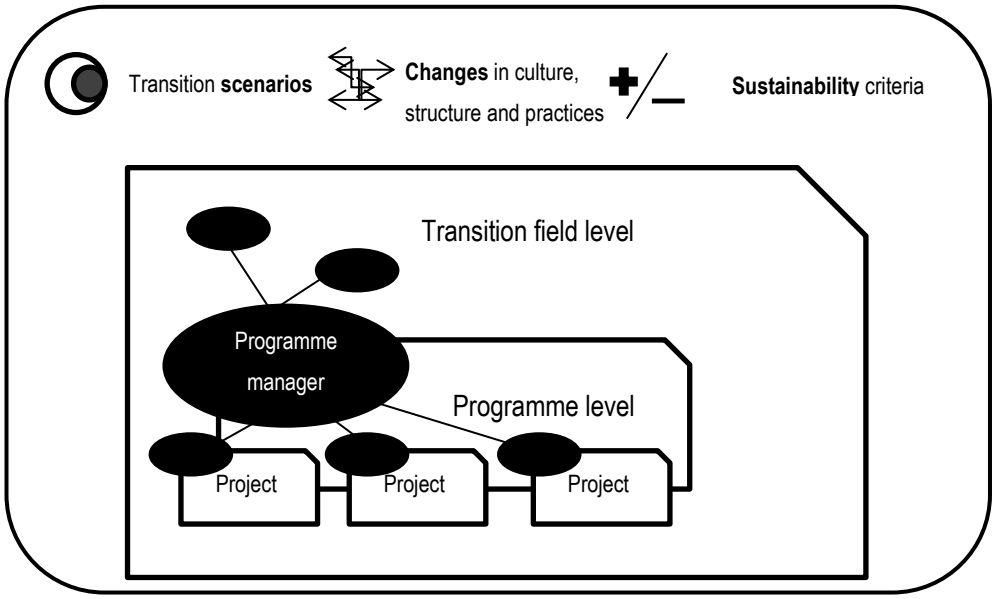

Figure 5.1: the monitoring framework

The three icons on top of figure 5.1 refer to the three monitoring dimensions transition scenarios, changes in culture, structure and practices and sustainability criteria. The different levels in figure 5.1 are the transition field level, the programme level and the project level. These levels can be monitored on all three dimensions. For example how does the transition scenario develop at project level, what are current changes in the project's culture, structure and practice and what is its sustainability effect.

Transition scenarios refer to the long-term ambitions of actors. Transition scenarios consist of a description of the current situation, the desired future situation and a series of developments and interventions that describe how the current situation is expected to be transformed in the desired situation. In this respect, a transition scenario is similar to a policy theory, theory of change, programme theory or plan. However this dimension focuses on a particular type of programme theory, theory of change, etc: one that aims to realize a fundamental change in the dominant culture, structure and routines of a regime. Transition scenarios can be used to frame which changes in culture, structure and practices and which sustainability criteria are relevant to monitor. At the same time different actors at different levels can be expected to have different transition scenarios for different reasons and actors may not even have an explicit transition scenario. Transition scenarios can change over time.

The second dimension refers to the actual changes in culture, structure and practices on the three levels. Cultural changes refer to paradigms, discourse, values and knowledge. Structural changes includes changes in physical structure (technology, products, land use, built environment, tangible resources) and social structure (institutions, organizations and networks, regulation, responsibilities, budgets and contracts). Culture and structure are constantly recreated through practices and at the same time enable and constrain practices.

The third dimension consists of sustainability criteria. These criteria are frequently related to social sustainability (people), ecological or environmental sustainability (planet) and economic sustainability (profit). Sustainability criteria offer the normative framework to assess transition scenarios and changes in culture, structure and practices.

Sustainability criteria play a role on all three levels. Transition programmes are initiated when sustainability issues in a certain transition field are identified. These sustainability issues are a driver and motivation for transitional change and monitoring how they develop and whether they actually result in change can provide relevant information. Sustainability criteria on different levels can be compared. Comparing the sustainability performance of individual activities with the current performance in the transition field for instance indicates the value of individual activities. Another way of using sustainability criteria is by comparing the current sustainability performance of an activity with its desired performance in the transition scenario. This provides distance-to-target types of indicators.

As a metaphor, transition scenarios form an anticipated route towards a fundamentally different, sustainable transition field. Indicators on changes in culture, structure and practices mark where you are on this route and sustainability indicators mark if you are on the right track.

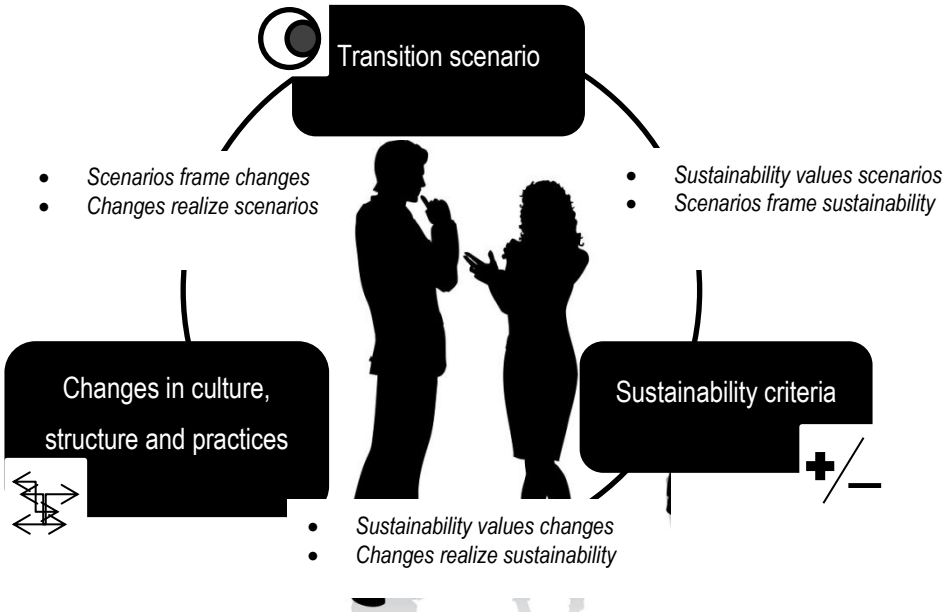

Figure 5.2: Transition monitoring entails discussion on interrelated indicator dimensions

This means the three dimensions are closely related. This is presented in figure 5.2. Changes in one dimension (for example a changing scenario) may lead to changes in the (indicators of) other dimensions. The alignment of changes in

the different dimensions is an important task for programme management and offers a first elementary programme management heuristic.

Elementary programme management heuristic #1: realize changes in practices, culture and structure in the direction of a transition scenario that is sustainable.

The three levels in figure 5.1 form a nested hierarchy. Projects take place in a programme context and both take place in the context of the transition field. Lower levels should be relevant to their context (for example projects should be relevant to the programme) in order to contribute to a transition. Figure 5.1 also illustrates that these levels can be regarded as a network in which programme managers work with both partners in the transition field and with project leaders.

The top level is the transition field, or context, the programme wants to influence. It can consist of different regimes and niches and its boundaries can be a sector, a production chain, an innovation system or a geographical region. In the end, it is the intention of the transition programme and the transition theories used, that define the transition field. System definitions may be ambiguous and contested and will change when the understanding of the transition that is pursued changes. Of special concern on the transition field level are the programme's strategic partners: the, often more powerful, change agents who finance, initiate or support the programme and that frequently need to change themselves in a transition.

The programme level refers to the entire network of change agents and portfolio of projects of the programme. Defining the portfolio is straightforward for more formalized programmes with a budget and contracts with specific projects. Other programmes are less institutionalized and therefore have more fluid relations with different activities (projects) and actors. For these programmes it can be difficult to draw the boundaries between whom and what is part of the programme and what is 'outside' in the transition field. The project portfolio and network of a programme will change over time. The portfolio consists of projects and programme activities. Programme activities fall under the direct responsibility of programme management and usually concern several projects. Examples of programme activities are organizing communities of practice, communication and PR, etc.

The project level consists of individual transition management activities, like an arena or a transition experiment. It should be noted that these activities may not always be called a project in the strict sense of a temporary activity undertaken to create a unique product or service with a specified start and ending and predefined objectives. In transition programmes, activities are sometimes necessarily open-ended, predate the programme and may be stimulated for the very reason to ensure their continuity. However, we use the term project to stick to conventional programme management terminology.

Just like the monitoring dimensions, also the three levels in the monitoring framework are interrelated. Programme management involves influencing (and learning from) all three levels. This leads to the second programme management heuristic.

Elementary programme management heuristic #2: align the levels in such a way that individual projects activities form a coherent and diverse portfolio that is relevant to –and influences- the transition field.

5.2 MODES OF MONITORING

The monitoring team consists of transition experts, programme managers and -if considered important- other programme stakeholders who co-produce the monitoring activities. The members of the team are likely to have different perspectives on the programme. The external transition experts bring theoretical and methodological knowledge, programme managers bring in-depth knowledge of the programme and transition field and –as the main users- the key questions for monitoring. Experts and managers can work together in four different modes of monitoring. In each mode the purpose of monitoring and its relation to other programme activities is different, leading to different roles of experts and managers in the monitoring process.

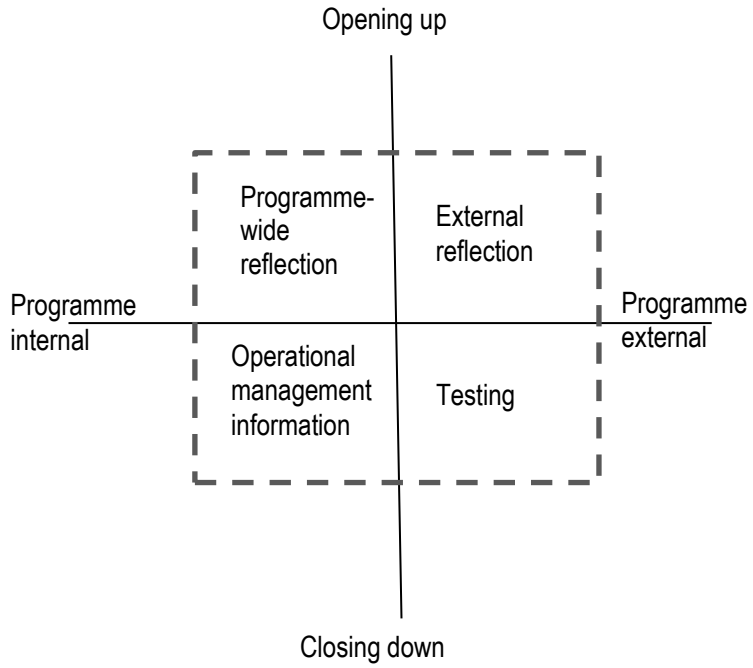

Figure 5.3 Typology of the different modes of monitoring

The four different modes of monitoring are presented in the typology in figure 4. Transition monitoring is a process of learning-in-action and takes place in co-production. Moving too far left or right along the x-axis, monitoring becomes purely internal or external and thus no longer a process of co-production. Learning-in-action requires a continuous interplay between reflection and action. Moving too far up or down the y-axis, monitoring is no longer an instrument for reflexive governance, but purely a routine activity. This means that all four modes are intermediary forms of monitoring, positioned between purely internal or external and between purely opening-up or closing-down.

In **programme-wide reflection,** transition monitoring is an instrument for reflection by programme management and strategic partners and project leaders. When all stakeholders are included or represented, this becomes a form of participatory monitoring. Involvement throughout the entire monitoring process contributes to learning and such learning is at least as important as the monitoring findings. In programme-wide reflection the theoretical framework and definition of scenarios, changes and sustainability criteria is the shared responsibility of all stakeholders. The quality of programme-wide reflection rests primarily on process criteria: whether the diverse viewpoints (including minority views)

have been included and articulated and the entire monitoring process was transparent for all involved stakeholders. Programme-wide reflection results in developing new ideas and questioning existing ones and can be rather resource intensive. It therefore needs to be targeted at periods when there is room for such reflection.

In **external reflection** experts like transition researchers, professional evaluators, etc. who are not heavily involved in the programme play a central role. They use their personal expertise to frame and monitor developments on different levels and dimensions in order to offer a fresh perspective on the programme. Co-production is still important to ensure the salience and legitimacy of the monitoring activities. The primary responsibility for the focus, the theoretical perspective and transition scenarios used, as well as their translation into indicators, data collection and analysis lies with the expert. The expert formulates steering suggestions or raises a critical discussion. Responsibility for the implementation of steering suggestions remains with the programme manager. Quality is related to the expertise of the external party. In the case of researchers, quality rests on standards of good research, along with the programme manager's evaluation.

In **testing** the transition scenario of programme managers is the central frame of reference, and not the external expert's or other programme stakeholders'. The role of external parties is to provide a transparent and independent check to verify claims and promises of programme management. Testing is similar to evaluation of goal attainment and auditing, in which it is checked whether previously agreed inputs, outputs and outcomes are delivered, although the characteristics for transition monitoring (see section 4.5) still apply. The quality of testing relies on the credibility of the methodology used. Salience and legitimacy need to be assured by involving programme management in defining the programme theory.

Operational management information means that transition monitoring becomes part of regular programme management. Monitoring experts and change agents work together to generate information flows for daily or regular decisions in programme management. Examples are assessing project development, deciding to include or exclude specific actors, developing an agenda for upcoming learning sessions, etc. In contrast to testing, the focus is more on shorter term developments and management relevancy than on programme outcomes and methodological strength. Unlike programme-wide reflection, the management relevancy is not the articulation, confrontation and questioning of different perspectives, but the production of action-ready management recommendations.

Table 5.1 Differences between modes of monitoring

	Programme–wide reflection	***External reflection***	***Testing***	***Management Information***
Responsibility for theoretical framework	Programme stakeholders	External experts	Programme management	Programme management
Responsibility for monitoring information	Programme stakeholders	External experts	External experts	Programme management
Responsibility for recommendations	Programme stakeholders, External expert	External experts	Programme management	Programme management, External expert
Process results vs content results	Process	Content	Content	Process+ Content

Primary source of quality	Participatory process and shared reflection	Theoretical strength	Quality of testing methodology	Hands-on information within the management context
Comments	Target at 'natural' periods for reflection	Maintain fit to programme context	Avoid overemphasis on plans and measurability	Assure connection to specific management issues

5.3 THE MONITORING PROCESS

As each programme phase (programme formulation, organization, deployment, appraisal and then again to programme formulation or programme dissolution (see section 4.2)) has different information needs, it is suggested to complete a monitoring cycle for each programme phase. Table 5.2 offers an illustration of monitoring activities for each phase.

Table 5.2; suggested activities to which TMon can contribute

Programme phase	***Potential contributions of TMon***
1. Formulation of strategy	Choosing between a visionary and transformative strategy Monitoring needs and expectations of programme stakeholders Analysing the programme context to identify critical success factors Dialogue to gain support from a strategic network in the programme context with other programmes, funders and ambassadors, etc
2. Organization of programme	Transformative strategy: Scanning for relevant transition activities and projects. Visionary strategy: monitoring activities to support the development of transition scenario(s) Programme level: development of the network and portfolio
3. Deployment of activities	Monitoring portfolio development Monitoring project progress Signalling unexpected transition dynamics and windows of opportunity Facilitating interaction between activities,
4. Appraisal	New transition dynamics that may warrant a changing strategy Outcomes at programme level, Project outcomes, including unexpected outcomes Selection of activities that need continuation
5. Dissolution	Stimulating transfer and anchoring of programme and project achievements Recording the experience gained and results for dissemination Ex post evaluation of programme

The monitoring process (see figure 5.4) consists of a cycle with four monitoring phases: (1) description and discussion of the programme based on the framework, (2) designing focused collection of information, (3) observing changes and (4) reflection and developing steering suggestions. In practice these phases may not be fully sequential. For example when the programme description already leads to steering suggestions or when first observations lead to a shifting focus.

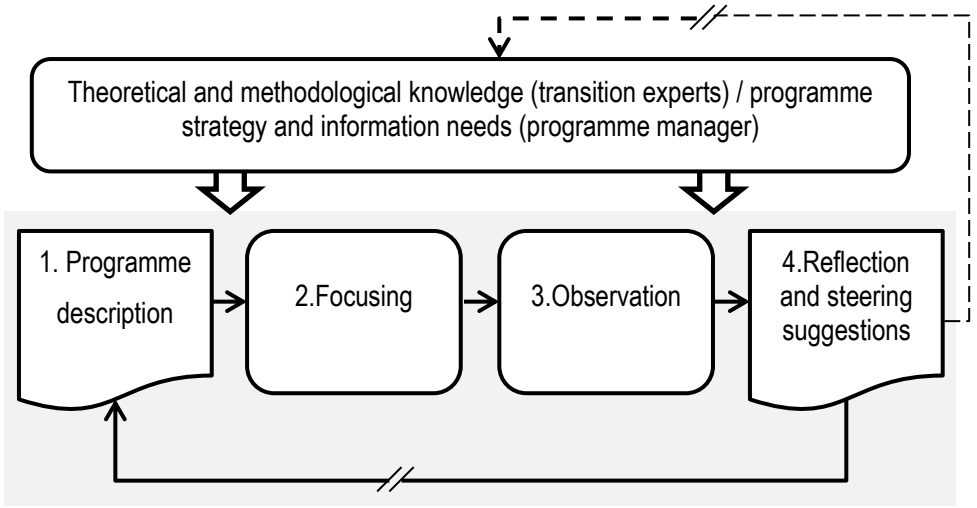

Figure 5.4: Monitoring process

PROGRAMME DESCRIPTION

The broad scope of the framework makes it versatile and generic. This should not be seen as an invitation to try and monitor everything. Indeed, this is a major challenge in transition monitoring. Because of the large ambitions, uncertainties and ambiguities that are central to transition processes and programmes, it can be very tempting to develop more and more indicators. For example to list all possible sustainability effects, or to try and be comprehensive in describing the relevant culture, structure and practices of a regime. Therefore the first step is to describe and discuss the programme in the monitoring team in general terms, using the framework as a template and later decide which specific monitoring activities are necessary. A good description of the transition field, programme and projects is not only of practical nature but may also spark relevant discussions about the role of the programme. In on-going monitoring efforts the description serves as a reference point that changes over time as a result on-going improvements of the programme. These discussions may reveal particular areas on which more information is needed. Later, this information needs to be interpreted in relation to the entire framework.

FOCUSING

The next process is to design and define more focused monitoring efforts. The design is tailored to the specific programme and monitoring questions. According to Lindblom (1979), it is far better and more rational to accept that being fully comprehensive is impossible and instead try to provide the best steering suggestions feasible by more skillful (disjointed) incremental analysis. Disjointed incremental analysis in this case consists of separate monitoring activities on specific issues in the programme.

Key elements to discuss in this process are the composition of the monitoring team, the desired mode of monitoring, definition of the transition field, strategic partners, programme and projects, insights from other and previous monitoring and evaluation activities, existing the information needs of the programme and the programme strategy and phase.

OBSERVATION:

The appropriate method for data collection depends on the availability of data and the specific focus with respect to the framework and modes. Methods may range from remote sensing to think-aloud protocols and focus groups. The results are summarized in a report. Monitoring information consists of a qualitative description and indicators.

An indicator is a sign or symbol for something often more intangible and harder to expose, it is an operational representation or abstraction of an attribute of a system. It is important to realize that an indicator is not the same as an attribute: a performance indicator is not the same as performance. Indicators highlight what is happening in a large system, or, more eloquently, they are "*small windows that provide a glimpse of the bigger picture"* (sustainable Seattle, 1995 in Abbot and Guijt, 1998). Indicators link the abstract to the concrete and as such:

- help bridge the gap between the concepts and day-to-day decision-making;
- show whether we are on the right track and in what direction we are headed;
- summarize or otherwise simplify relevant information, make visible or perceptible phenomena of interest, and quantify, measure and communicate relevant information (Moldan, Bilharz et al. 1997).

Quantitative indicators are easier to compare, aggregate and combine. In some situations qualitative information is preferred over indicators. Using an indicator requires a shared understanding in the monitoring team what the indicator stands for: that it is a good indicator and that it is relevant to monitor it. For instance, the indicator "CO_2-emissions in the construction process" to indicate sustainable development in construction, implies a shared understanding that global warming is one of the biggest sustainability issues and that CO_2 emissions in the construction process is the appropriate indicator for this. Without such a shared understanding (eg when others feel that the CO_2 emissions of building materials, the CO_2 emissions as a result of using the building or the durability of the building are more important), it would be better to describe qualitatively which sustainability issues are considered important throughout the programme and then discuss how to deal with these different issues. Another reason to use qualitative information is when an event is considered unique. Unique events are either one-off (like monitoring what parties form the government coalition) or different from any other event (a particular opinion). A related issue is that quantitative indicators are unfit to monitor the character of events that are unanticipated. Finally, some developments are plainly difficult to measure quantitatively like changes in a transition scenario. Qualitative information will always play a role in transition monitoring.

INTERPRETATION

In the final monitoring process the results are interpreted in light of the broader framework and used to formulate recommendations using steering heuristics. Steering heuristics are needed to connect monitoring results to specific steering suggestions. In terms of process, it is important to involve the people that are responsible or otherwise necessary for implementing a steering suggestion in the process of formulating these steering heuristics and suggestions.

The simplest heuristics are based on an individual piece of qualitative or quantitative information in the framework. For example "if there is no notion of the sustainability effects of an experiment => develop such a notion". Other examples are comparing an indicator value to previous values or norms (eg to monitor the development of a transition scenario in a programme by comparing it to the criteria (or norm) for transition scenarios developed by Sondeijker (2009), and if it falls short of some criteria then improve it.

More refined heuristics are based on the relation between different elements in the framework. The two elementary steering heuristics for programme management are (1) realize changes in practices, culture and structure in the direction of a transition scenario that is sustainable and (2) aligning the levels in such a way that individual projects activities form

a coherent and diverse portfolio that is relevant to –and influences- the transition field. These heuristics can be made more specific with specific transition theories and programme considerations. An example is "if the type of activities and change agents in a programme does not match the current transition pattern => reflect on how you change the projects so they have a better fit" or "if the sustainability issues most important to the programme are not the sustainability issues that strategic partners care about => find ways to link these through strategic programme management."[10]

In the following chapters this monitoring approach is applied in different programmes. Based upon the experiences in these pilots, the final chapter (chapter 11) draws lessons and further specifies the approach.

[10] *The first example is used in the monitoring application for New Gas in chapter 6, the second in the first monitoring report for RCI, chapter 7*

CHAPTER 6 TPLZ: EXPERIMENTS IN HEALTH CARE

"*Transition experiments are different from regular projects. Because they chart unknown territory, one is continuously confronted with surprises that require adjustments. Transition monitoring is therefore not meant to stick to the original planning in which any adjustments are treated as implicit and of less importance. This is often the case in regular projects. Within transition experiments however, adjustments are seen as a type of learning-by-doing and registering these adjustments as a type of monitoring that enables the participants to make their lessons explicit and share them. In other words: for transition experiments regular adjustment is a goal in itself which monitoring plays a crucial role*."

Transition monitoring handbook for TPLZ, 2008

6.1 INTRODUCTION TO THE CASE STUDY

This case study is about the design and implementation of transition monitoring in the Transition Programme for long-term Healthcare (TPLZ). TPLZ was based on transition management thinking and transition experts from DRIFT (Dutch Research Institute for Transitions at the Erasmus University Rotterdam). were part of programme management as action-researchers. These DRIFT researchers saw the programme as an opportunity to learn more about the applicability of transition concepts and instruments, including transition monitoring. The case explores four different aspects of the TMon approach in line with the research question: "What can we learn about this monitoring approach when it is applied in cases with (a) different programmes strategies, (b) different modes of monitoring, (c) multi-level monitoring, and (d) regular redesign of monitoring activities?":

- **Programme strategy.** TPLZ followed a transformative programme strategy (see chapter 4). As described in section 4.2, a transformative strategy implies that more general themes and a long-term vision develop over time, informed by the concrete experiences in different innovation projects. TPLZ started by supporting diverse projects that locally experimented with providing long-term healthcare in innovative ways. TPLZ therefore used the term 'experiment' rather than '(innovation) project' as its projects were seen as activities to learn about promising routes for long-term systems change.
- **Modes of monitoring.** Monitoring was largely conducted in the mode of programme wide reflection (see chapters 4 and 5). Monitoring was used as an instrument stimulating joint reflection by project leaders and programme managers on the development of individual experiments and the portfolio as a whole. The resulting lessons were used for project support, improving programme management and the use of transition theories in practice.

- **Multi-level monitoring.** This case explores the relation between programme and project level monitoring from two perspectives: the programme and the project perspective. The central unit of analysis is the project monitoring implemented by the programme. This monitoring is used for project support and for portfolio management. To further explore multi-level monitoring, a second unit of analysis is added: the monitoring activities that one of the projects (Prinsenhof) initiated next to the project monitoring required by TPLZ. The possibilities and limitations at both levels are evaluated separately and then compared.
- **Regular redesign of monitoring activities.** During the initial monitoring design**,** the monitors expected that the monitoring format would change over time. Although various attempts were made, this did not occur. I will explore why this was the case and what its implications are for TMon.

The case study is based on various sources of information. These include participant observation in the design and analysis of the TPLZ and Prinsenhof monitoring, interviews with programme staff and analysis of programme documents. Another important resource are the case study reports of other involved transition researchers, especially the dissertation of Suzanne van den Bosch (2010). In both the TPLZ programme and the Prinsenhof experiment, I advised on transition monitoring, primarily during the design phase, in the Prinsenhof experiment I was part of the steering committee for the monitoring activities.

This chapter is structured as follows. Section 2 describes the TPLZ programme. Section 3 describes the monitoring design for TPLZ, resulting in a so-called 'monitoring-matrix'. Section 4 describes the implementation and results of the monitoring matrix within individual experiments, at programme level and as an overarching framework for the full portfolio of programme management instruments. Section 5 describes the design and implementation of monitoring activities specific to the Prinsenhof experiment. Section 6 analyzes the lessons for the TMon approach and section 7 finishes with some concluding remarks.

6.2 THE TRANSITION PROGRAMME ON LONG-TERM CARE

Long-term care refers to people that are in need of more or less continuous care for multiple years, like care for the elderly, the disabled and disadvantaged youth and families. In 2008, the Dutch care system that provides these services is subject to increasing pressures. Examples are rising expenditures, an ageing population and work force, new technological possibilities and concerns about the quality of care. Internally, the care system has become increasingly specialized, large-scale and managerial through its focus on standardized products and efficiency. According to the TPLZ programme this has broken down essential connections. Connections between patients, their social networks and professionals, between management and those that offer care in their daily work, between addressing often interrelated health and social issues, etc. Without remaking these connections, the care system has trouble adapting to the increasing pressures. This means that the care system is not only in need of individual innovations but may also need to rethink the dominant ways in which it is organized and conventional paradigms about health and health care service delivery in light of these long term societal pressures (DRIFT, 2009). It may be in need of a transition. Within this context the Transition Programme in Long-term Care (TPLZ) was created.

Van den Bosch (2010) describes the development of the programme. As a result of changes in regulation, the Department of Health, Welfare and Sports and sectoral organizations had reserved a budget for innovations in care. The

working group Innovation in Care advised about its allocation. After a presentation on transition management, the department's working group recognized the potential of a transition programme, alongside the ZonMW programme which focused more on implementing existing innovations in long-term care. A consortium was formed for the daily management of the programme, consisting of Ernst & Young, CC Care Advisors and DRIFT. These partners brought with them financial, health care and transition expertise respectively. Ernst & Young was the main contractor for the programme. DRIFT was responsible for expertise on transition management, which was to be the central guiding concept of the programme. The programme ambition was to support experiments to explore the opportunities and barriers for a care transition, but also to learn how transition theories and TM instruments like transition monitoring can be used to manage innovation programmes. The board was formed by the Working Group Innovation in Care with representatives of the Department and different branch organizations (GGZ Nederland, Actiz, BTN, VGN and later representatives of care clients and care insurance companies)[11]. Figure 6.1 offers an overview of key activities in the TPLZ programme.

Writing an action plan started in September 2006 and programme organization in January 2007 (see figure 6.1). Three important choices were made: (1) starting with transition experiments instead of developing a sustainability vision in a transition arena, (2) initially selecting a limited number of experiments and (3) focusing on transition experiments. The choice to start with experiments and not wait until a vision was developed was influenced by the Department and sector representatives who were under pressure to spend their budget and wanted to offer an immediate impulse to innovations in the sector. There were also concerns that the group that would develop the vision would act as another steering group, which would complicate the programme management structure. February 2007, programme management and the working group identified 11 potential experiments from their own network. These experiments formed the first tranche and started in August 2007, after a definitive go on the financing was obtained and the experiment proposals were brought in line with transition management criteria and other selection criteria (see Van den Bosch 2010). Early 2008 a second tranche of experiments was selected, this time based on a public call for experiments. The call results in 129 applications and finally in 42 full proposals of which programme management selected 16 new experiment. Also in 2008, and after additional funds were found, a transition arena started to develop a vision on sustainable healthcare.

The TPLZ strategy is an example of a transformative strategy. It can also be called a bottom-up transition management (Van den Bosch 2010), because the programme starts with transition experiments and only later initiated a transition arena and (additional) tactical activities. The different partners in the programme management consortium had their own ideas, expertise and tools for programme management. An example is the selection of experiments where DRIFT-associated managers advocated open-ended, qualitative criteria while Ernst & Young consultants wanted SMART goals (Van den Bosch 2010). In the end the selection criteria were a hybrid between the more learning-based and systems-change perspective advocated by DRIFT and the more traditional project management perspective advocated by Ernst&Young.

[11] *Since November 2007 also the participated in the Working Group Innovation.*

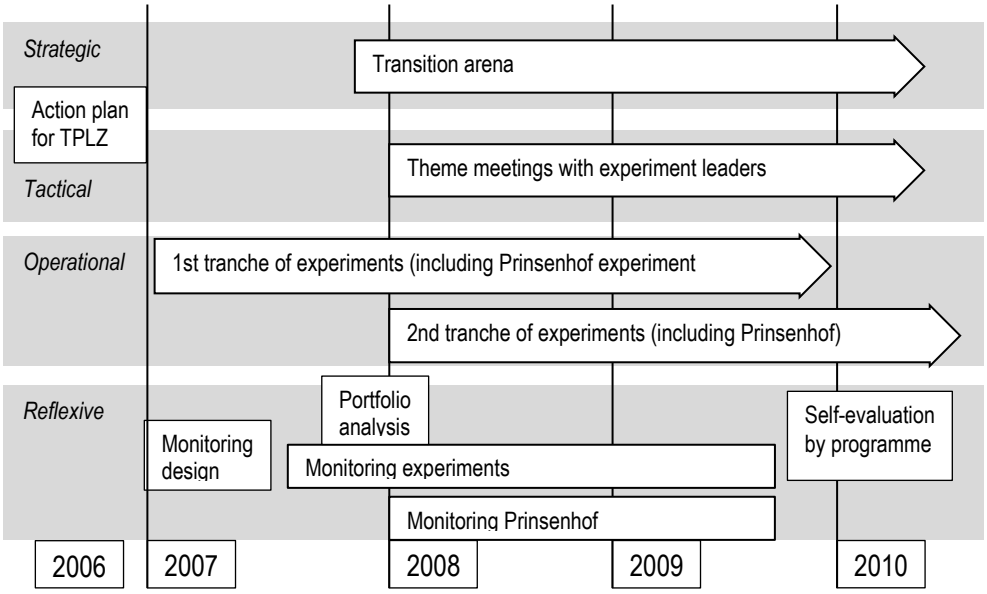

Figure 6.1: Overview of TPLZ activities

6.3 MONITORING DESIGN

FOCUS

In spring 2007 the programme faces the question how to monitor the experiments and the learning process about opportunities for a transition in long-term healthcare. In a series of discussions in May-July 2007 between (primarily) transition experts[12] the monitoring design was developed. In line with the programme strategy, the focus of the monitoring was on stimulating learning in individual experiments to the benefit of both programme managers and experiment leaders. More specifically the initial purpose of monitoring was (1) to offer programme management insight in the on-going experiments for indirect project management and (2) to support and facilitate experiment leaders in recording and sharing their experiences and positioning themselves in a broader transition context.

Monitoring portfolio development and the dynamics in the transition field was not considered relevant for the programme at this time. It was chosen to start with a relatively open-ended and qualitative design. At the time the monitoring team expected that, after the programme gained experience with this design and new information needs surfaced, the monitoring would be adapted and expanded.

THEORY OF CHANGE

In the TPLZ programme plan, three different transition concepts and theories were used. These were (1) transition management, (2) the idea that transition management should lead to a new set of culture, structure and practices within health care and (3) the mechanisms of deepening, broadening and scaling-up to describe and manage transition experiments. It was briefly considered to monitor changes in the culture, structure and practices of the experiments. The

[12] *Suzanne vd Bosch, Roel van Raak, Mattijs Taanman (all DRIFT) Henk Diepenmaat (Actors BV.), Jord Neuteboom (Viatore) and Peter van Felius (Ernst & Young)*

team concluded that these elements were more relevant for selecting experiments than for monitoring them, because culture, structure and practices were not likely to change fundamentally and difficult to influence by programme management. The rule of thumb being that monitoring should be based on those features that are expected to change and can be influenced, whereas selection should be based on features that cannot be influenced when experiments are up and running. Instead, the monitoring was based on the mechanisms of deepening, broadening and scaling up.

These mechanisms have been primarily developed by Suzanne van den Bosch (Van den Bosch and Taanman 2006; Van den Bosch 2010). The mechanisms can be used both descriptively (they can be used to analyse transition experiments) and prescriptively (these mechanisms should be stimulated from a TM-perspective). Theoretically, they are rooted in evolutionary innovation literature (Levinthal, 1998; Nooteboom, 1999; Schot and Geels, 2007) and transitions literature (eg Rotmans et al 2001; Geels, 2004; Loorbach, 2007).

Deepening is a learning process through which actors learn as much as possible about a transition experiment within a specific context. This learning process concerns the innovative cultural, structural and practice-aspects that characterise the experiment, the benefits of the experiments, the relation between the experiment and the regime and the development of new strategies. Broadening is repeating a transition experiment in a different context and/or linking it to other innovations. Broadening refers to both the innovative aspects of an experiment (for example recombinations of innovations or new uses of an innovation) and to the replication of an experiment in a new context. Scaling up is embedding a transition experiment in dominant ways of thinking (culture), doing (practices) and organizing (structure), at the level of a societal system (Van den Bosch 2010).

MONITORING MATRIX

In the monitoring design the mechanisms of deepening, broadening and scaling up were related to the monitoring dimensions transition scenarios, changes in culture, structure and practices and sustainability (see chapter 5). These dimensions further specify the ideas on deepening, broadening and scaling up. For example the learning process of deepening can be about transition scenarios, navigating structural barriers and sustainability claims. Combining the mechanisms and monitoring dimensions results in a 3x3 monitoring matrix with nine questions that formed the basis for monitoring the TPLZ experiments (see figure 6.2). This format is based on open questions rather than specific indicators. This was done for two reasons. First, the team developing the matrix considered asking open questions a more reflective activity than collecting data on indicators. Secondly, asking open questions was seen as a first explorative step way to develop indicators at a later stage. Transition monitoring was described as a process in which there is "*more interaction between different experiment leaders and programme management, developments and problems are identified in a coherent manner and space is created for innovative solutions. Monitoring is more a dialogue than a report. [...] It is demand-driven rather than data-driven and there is more attention to cohesion, qualitative information and on-going mutual influence and steering and less to analytical reduction, quantification, linear cause-effect relationships and accountability after the event*" (Ernst&Young advisors et al. 2007).

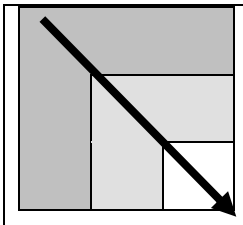	**Deepening:** Actions aimed at learning as much as possible from the experiment in the specific context	**Broadening**: the experiment's transition scenario with the own organization, peer groups or similar projects?	**Scaling up**: Bringing the scenario of the experiment to the attention or embedding it at sector level?
Transition scenario Indicators aimed at the transition scenario: the problem, future image and pathway	1.1.How has the scenario of the experiment been developing and why?	1.2. In which way is the experiment's scenario aligned with and stimulated within the own organization, peer groups or similar projects?	1.3. In which way is the scenario of the experiment used actively in the sector?
Structural change: Indicators aimed at dealing with opportunities and barriers	1.4. In which way are new possibilities and barriers within the local context of the experiment utilized?	2.1. How does the experiment cooperate with similar projects, to deal with the possibilities and barriers in a broader context?	2.2. In which way does the experiment remove institutional barriers at sector level and which support is needed for this?
Sustainability Indicators aimed at testing projected and realized sustainability effects	1.5. In which way are lasting benefits realized in the experiment and how is evidence provided?	2.3. In which way do the lasting benefits apply to other contexts and what does the experiment do to research and improve this?	3.1. In which way are lasting benefits diffused at sector level and negative side-effects prevented

Figure 6.2 TPLZ monitoring matrix

The matrix was discussed with the entire management programme team. As a result of these discussions a temporal aspect is added to the matrix. Programme managers suggested that the questions respond to different phases in the development of experiments. This way the matrix can be used to track the expected development of experiments through three phases.

Phase 1 consists of the questions 1.1-1.5 in the matrix (see figure 6.2). Experiments are first expected to:

- Further develop the transition scenario
- Identify and utilize new local opportunities and remove or mitigate local barriers
- Provide evidence of the benefits of the experiment
- Align the transition scenario with/ gain support for the scenario within the own organization, peer groups or similar projects
- Stimulate the wider use of the scenario within the sector

Phase 2 is about questions 2.1-2.3 on broadening and scaling up

- Cooperate with other experiments and realize spin-offs in different contexts.
- Remove (or gain support for removing) structural barriers in the care system
- Collect evidence of the innovation's sustainability effects in other contexts too

Phase 3 is about question 3.1 and refers to improving the sustainability performance at sector level

- Provide evidence of further diffusion of the benefits and take measures to prevent negative side effects.

HANDBOOK TRANSITION MONITORING

Next, discussion started on how to implement the matrix. The programme team developed a handbook transition monitoring based on the matrix. The handbook on transition monitoring discussed the central ideas of transition monitoring and the framework. The handbook contained all communication, learning and monitoring activities of the TPLZ programme. Together these served four functions: accountability, communication, management & intervention and learning. Discussing each programme tool would mean going into too much details (and some of these tools were not even implemented as we'll see later on), but table 6.1 presents the way that in total 14 programme tools were categorized according to the matrix. This diverse set of tools included learning meetings, web-based newspapers, a list of communication activities by experiments, annual reports and sheets to systematically list programme interventions.

Table 6.1 overview of proposed M&E tools

	Deepening	***Broadening***	***Scaling up***
Transition scenario *Problem perception,* *Vision,* *Pathway*	-Project summary -Project contract -Community webpaper -Programme Dashboard -Seasonal talks -Annual report	-Project contract -Project presentation -Public website -Programme Dashboard -Seasonal talks -Annual report	-Lists of learning products -Programme Dashboard -Seasonal talks -Annual report
Change *Structure,* *Culture,* *Practices*	-Community webpaper -Programme Dashboard -Transitionsheet interventions -Seasonal talks -Annual report	-Public website -Community webpaper experiment -Community webpaper programme -Transitionsheet interventions -Programme Dashboard -Project leader meetings -Learning meetings -Seasonal talks -Annual report	-Lists of learning products -Programme Dashboard -Seasonal talks -Annual report
Sustainability *People,* *Planet,* *Profit*	-Social Business case -Programme Dashboard -Seasonal talks -Annual report	-Public website -Social business case -Programme Dashboard -Seasonal talks -Annual report	-Social business case -Programme Dashboard -Seasonal talks -Annual report

6.4 IMPLEMENTATION AND RESULTS

THE USE OF THE MATRIX AT PROJECT LEVEL

In 2007, the most important project-level tools were seasonal meetings with experiment leaders and annual reports. During the seasonal meetings programme managers and experiment leaders sat down to discuss the value of experiment for a larger transition process, rather than discussing internal project matters only. This helped formulate new

activities regarding broadening and scaling up, identify sector barriers and involve new stakeholders in the experiment. According to programme managers the matrix was used in two ways.

One was to develop an action plan for the coming months. The progress of the experiments was then monitored by checking whether this plan was executed and formulating new plans in subsequent seasonal talks. An example is the experiment "ACT youth". In this experiment care professionals were active on the streets in schools, etc. to find, interest and help youth with complex problems and without a permanent address as opposed to waiting for them to 'come to' the care system with its different, specialized pigeon holes. Their motto was to find, interest and engage youth with multiple problems. With the help of a DRIFT researcher, actions were positioned and prioritized with respect to the matrix. Table 6.2 shows 10 actions and their relation to the matrix for the seasonal talk in January 2008. These 10 actions formed the short-term action plan of the experiment.

Table 6.2 Priorities defined in first transition monitoring meeting of ACT-Youth, based on the monitoring matrix and analysed by Suzanne van den Bosch (Van den Bosch 2010). Scaling up was not defined as a priority yet.

	Deepening	***Broadening***	***Scaling up***
Direction	1. Strategy session (to redefine the mission, vision and approach of ACT-Youth together with team managers)	4. Informing the top of the organisation 6.Communication/PR-plan (internal & external)	5. External media (e.g. independent journalists)
Change	2. Structuring teams (to overcome organisational barriers) 3. Team meetings & meetings Transition Programme 3b Transition monitoring 3c Client participation (e.g. in web paper)	9. Broadening within region (e.g. cooperating with partners, pilot The New Chance) 10.Broadening outside region (supporting in setting up ACT-Youth in different cities)	
Sustain-ability	7.Businesscase (including long-term structural financing) 8.Social business case (insight in societal costs& benefits)	11. Knowledge centre (positioning ACT-Youth in national ACT knowledge centre and related literature and research)	

A second use of the matrix was for reflective discussions (opening up) instead of developing action plans (closing down). For this purpose a programme manager made the questions in the matrix more reflective. She also indicated that DRIFT-based programme managers often used the matrix, whereas the Ernst&Young-based programme managers in practice focused on their own tools like the webpaper, the learning product list and the social business case.

Data collection was complicated because the seasonal talks and annual reports followed a format in which the matrix was added as a separate and final item. From the monitoring handbook it would be expected that the matrix would play a central role in this format. The format was developed by Ernst & Young and contained seventeen items on general developments, attainment of prior defined goals, knowledge products, etc. This illustrates the differences between the Ernst & Young advisors who considered the matrix as an add-on to their existing project management methods and the DRIFT researchers who considered the matrix as the central organizing framework. As a final question, there was often little time to discuss the matrix specifically. Moreover the questions in the matrix overlapped with earlier items. Questions appeared to be ambiguous and experiment leaders felt they were asked the same question twice. Take question 1.4 in the matrix: "*In which way are new possibilities and barriers within the local context of the experiment utilized*?'. This

question strongly overlapped with two earlier asked questions in the format: "*what do you consider to be critical success factors in this phase in retrospect*?" and "*what have been the major barriers for you in this phase*?". This meant that data on all questions had to be recombined at a later stage by programme management to fill in the matrix.

Later in 2008 and 2009, the programme added a second tranche of 16 experiments to the portfolio. In its 2008-2010 programme plan, TPLZ announced that this required more efficient programme management. The programme had moved from a phase of programme organization and development, to a phase of programme deployment (see also chapter 4.3) and was now at 'full speed'. TPLZ argued that this phase required exploiting the developed tools as outlined in the monitoring handbook more efficiently instead of spending a lot of time into developing new monitoring tools. This was not what the developers of the monitoring matrix had initially expected.

Another monitoring and evaluation tool became more important in this period: the social business case (see textbox). The social business case became the second main monitoring and evaluation tool. The social business case is an ex ante evaluation of the long-term sustainability effects and benefits to different stakeholders.

Over 2008 and 2009, the seasonal meetings became less important. Programme staff

> The **Social business case** is developed and applied by Ernst & Young. It is a social return on investment method that calculates societal value. The costs and benefits of the experiment are determined for four different actors: the client (who defines needs), the care provider (who defines the business case,.), the care organization (describing the investments, costs and benefits for the organization), the social stakeholders like the municipality or wider community (describing the longer term social benefits). The benefits are estimated and expressed in financial terms as much as possible. The social business case helps to bring stakeholders together and agree on the value of an experiment: the social benefits (like avoided health care costs in prevention programmes) compared to the necessary investments. The results provide insight in how the costs and benefits are distributed across actors. This helps to start a dialogue on who should bear the costs and thus secure long-term financing. The social business case helps to close down on the level of experiments. It is an instrument for operational management information.

supported a second group of experiments more intensively and felt less need for additional seasonal talks. At a programme level, they shared their information during programme team meetings and team sessions. This reduced the added value of regular, structured meetings between experiments and the programme and their frequency dropped to once a year in order to prepare the annual reports. These reports were still based on the format developed for the seasonal talks. In the same period the first group of experiments started to reach the end of their TPLZ financing. They asked the programme for support with securing structural financing. For example by involving local stakeholders more closely in the experiment and making the (financial) benefits of the experiment to these stakeholders and society at large more explicit. For this purpose the social business case (supported by Ernst & Young) was more operational and appropriate than the monitoring matrix.

The experiment Prinsenhof (to which we will return in the next section) effectively used the results to generate longer-term commitment by stakeholders (see section 5.5), but for other experiments it was not clear how and whether the results of the social business cases were used (interview programme manager 2010).

THE USE OF THE MATRIX AT THE PROGRAMME LEVEL

The annual reports of the experiments, combined with an additional questionnaire, are used to conduct a cross-section of the experiments (a portfolio analysis) of the TPLZ programme early 2008 and 2009. Early 2008, the progress of the programme as a whole was described by aggregating the individual annual reports on 2007 from the original 11 experiments and an additional questionnaire (TPLZ 2008). DRIFT researchers played a large role in this programme an portfolio analysis.

The monitoring matrix was used to describe the progress and key issues in the portfolio. As discussed earlier, the way that the matrix was used in the format for the annual reports complicated the analysis and comparison between experiments. Several experiments indicated in their annual report that they needed more help to fill out the matrix. There were also differences in the way experiment leaders interpreted the matrix questions and other questions. For example whether questions referred to ambitions, concrete plans, activities or real results. This made the analysis rather non-transparent. For example the cross-section report stated that all experiments continuously learn and modify their transition scenario. In contrast, in the annual reports 4 out of 11 experiments indicated that they did not modify their transition scenario.

The cross-section gave examples of actions regarding of deepening, broadening and scaling-up of different experiments and the programme team concluded that the "*eleven reports show a clear picture of the status of the experiments*". According to the cross-section the primary attention went to deepening with regard to the transition scenario and changes in culture, structure and practices. This matched the earlier expectations in the programme on how experiments develop. On a small scale a few experiments were engaged in a process of broadening. One project (district care) was ready for broadening and scaling up. The programme team expected that other experiments would show the same development in the remainder of 2008.

Experiment leaders asked for different types of support by programme management (TPLZ 2008):

- Use of the expertise of different programme managers in fields like management, project management, advice on collaborations and transition (management) expertise for advice and support.
- Using its nation-wide network for PR and support groups
- Continuing knowledge exchange between transition experiments
- Connecting the experiment to strategic partners like the National Healthcare Authority to realize more structural financing.

One of the original aims of the transition monitoring activities was to expand the scope from projects to the programme as a whole and later to the transition field. Early 2008 two new programme-level monitoring applications were proposed, but these were not implemented. The first was a portfolio analysis based on a clustering of the key problems addressed by the various experiments from the first tranche. This clustering was done to inform the selection of the second tranche of experiments. The underlying assumption was that the experience with the first tranche should be used to purposively select additional experiments. However, programme management decided to largely keep the criteria that were

developed in the first selection process[13]. A second monitoring application was designed to create a stronger connection between the experiments and the transition arena. The plan was to regularly ask experiment leaders to write down a story about the important changes they recently experienced (eg regarding broadening and scaling up, effects on patients/users or their innovative concept) or alternatively answer a question posed by the transition arena. All experiment leaders and transition arena members would then be asked to pick out the stories and answers they considered most significant and explain why they felt so. The programme would then take action (if necessary) on the identified issues and communicate the stories. This proposal (based on the most significant change approach (Dart and Davies, 2003) would result in systematic learning between programme, experiments and arena, and a regular flow of stories for external communication. However, programme management did not consider the added value of these activities large enough to devote the necessary time in its implementation.

Early 2009, programme management made a new portfolio analysis based of the first tranche of experiments (TPLZ 2009). The cross section lists the major drivers, barriers and learning points of experiment leaders. It concluded that the experiments from the first tranche had become more stable. Experiment leaders and programme managers identified new issues like the inventory of risks after TPLZ financing stops and more attention was needed to market experiments for which programme support would end in 2009. Experiments asked programme management to coach the experiment to help prepare for the situation after the TPLZ support ended including help to obtain structural financing. The monitoring matrix was used to summarize and compare the first 10 experiments (figure 5.3). For each of the nine elements in the matrix, programme management did an inventory whether activities were initiated and had led to results in 2008. This provided an overview of the progress in the different experiments. This representation (although crude) showed that three experiments (District Care, ACT and Prinsenhof) were moving to a new phase with a focus on broadening and scaling-up, while other experiments like STEM were still in a phase of trying out their transition scenarios in practice. This raised questions on what the programme should do regarding both more and less successful experiments.

According to the cross-section, District Care, Prinsenhof and ACT had developed most in terms of broadening and scaling-up. Key success criteria were their innovative features and their promising sustainability advantages. Prinsenhof and ACT were however still financially vulnerable and needed continued financial and organizational support from existing care institutions. The other question was what to do with experiments that were not yet broadening and scaling up. These experiments continued to get support from sectoral care organizations in the TPLZ board, but also from programme managers who felt that the qualitative criteria in the matrix did not capture the unique and innovative aspects about these experiments and thus felt a lack of legitimate and objective criteria to decide to stop or continue supporting these experiments.

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[13] There were some differences between the two selection rounds though. The second selection round was based on an open tender, instead of the existing networks, resulting in the need to make the selection process more systematic and transparent. One selection criterion was added referring to the anticipated activities regarding deepening, broadening and scaling up (Van den Bosch, 2010)

The cross-section resulted in several reflections (TPLZ 2009). There were relatively many intentions (the light gray cells), but few of these actions were realized. The programme was aware that maybe too much attention had been paid on formulating new ambitions (opening up) and too little on realizing this vision and "making concrete steps on a transition pathway" (closing down). A second reflection was that it was difficult for experiments to demonstrate their sustainability effects and to guarantee the continuity of the experiment. The social business case developed by Ernst & Young, was seen as part of the answer (see previous section). Furthermore it was noted that experiments that demonstrated their (local) sustainability advantages and potential for scaling-up, attracted more attention and could therefore broaden and scale up more.

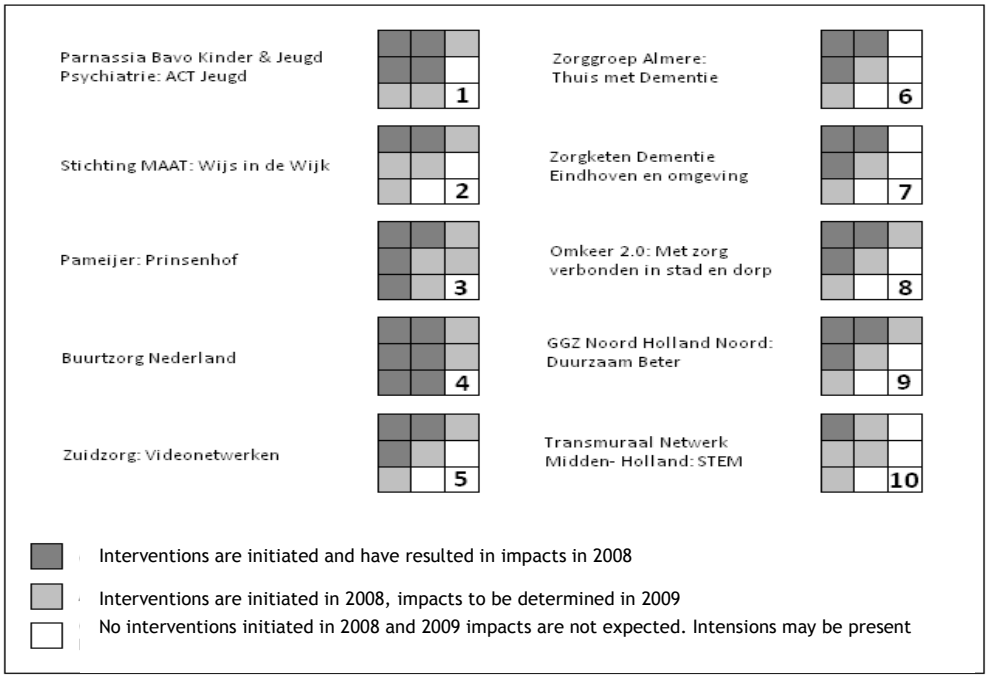

Figure 6.3: Progress of different TPLZ experiments

While the programme started preparing for its resolution in 2010, the programme initiated further activities to generate more aggregated, portfolio-level lessons and results. Examples were thematic meetings of experiment leaders of the first group of experiments (in 2008), followed by master classes (2009). A planned meeting to discuss these lessons with sectoral organisations and the Ministry failed. A second activity was a double programme evaluation conducted in 2010. The care-specific lessons and results about the innovative types of heath care were to be reported in a 'meta-social business case'. A second evaluation listed the lessons about managing an innovation programme and experiments that were distilled from interviews and workshops with strategic partners and experiment leaders. These stakeholders re-emphasized the importance of transitions thinking (added value of transition theory, aiming for diversity and innovativeness, etc.) and a learning and people-based approach to programming. The lessons were specified for programme management, strategic partners, experiment leaders and the care organizations involved in the experiments.

As mentioned, the matrix was also used to in the transition monitoring handbook to structure the repertoire of programme management tools. Comparing the original monitoring handbook to the later programme practice in 2010, showed that roughly one third of the initial 14 tools was no longer or had never been used, one third only played a small, primarily administrative role and one third had an important function to the programme. The most important tools were

the various sessions with experiment leaders (the learning, experiment and thematic sessions), annual reports (including the monitoring matrix) and social business case. The most used tools were related to the core ambition of TPLZ to foster learning between experiments (learning, experiment leader and thematic sessions) or were obliged for accountability (annual reports). Tools that were of less direct concern for accountability and learning (like the web-based newspaper) were used less.

The matrix was an instrument to monitor experiments and the portfolio for programme managers. It is interesting to see if programme managers and experiment leaders want different information on experiment development. Therefore the next section will look more closely at the experiment-level monitoring for the Prinsenhof experiment. The lessons for transition monitoring will be analysed later.

6.5 MONITORING THE PRINSENHOF EXPERIMENT

Comparing the project monitoring needs from both a TPLZ perspective and that of a particular project experiment leads to additional lessons for the relationship between project and programme monitoring. If the different monitoring needs strongly overlap, only one set of monitoring activities may suffice. This set would need to be salient and legitimate from both a programme and a project perspective, which is a strong argument for the inclusion of both programme and project stakeholders in transition monitoring. This section focuses on one experiment within TPLZ: the experiment Prinsenhof. Within TPLZ, Prinsenhof is considered as one of the more successful experiments in terms of broadening and scaling up (see earlier).

From 2008-2010, I was part of the monitoring advisory group of Prinsenhof, together with Chris Kuijper, lector at Rotterdam University (Hogeschool Rotterdam) and led by Geertje Moree van Capellen, experiment leader of transition experiment Prinsenhof. This group advised on the set-up of an monitoring and evaluation (M&E) structure at Prinsenhof, reflected on chosen M&E topics, methods and indicators and mediated between Prinsenhof, on-going research and students of Rotterdam University who became involved in Prinsenhof.

THE PRINSENHOF EXPERIMENT

Prinsenhof is a meeting centre located in the Lage Land neighbourhood, Rotterdam, in which several recreational and care functions for elderly and mentally challenged people are integrated. In the future the elderly community council Prinsenhof wanted to manage the centre with professional (and financial) support of a housing cooperation (De Nieuwe Unie), an organization for the mentally challenged (Pameijer) and a care organization for elderly (Laurens). The experiment wanted to show that community-owned and integral care is feasible, self-supportive and socially desirable. According to the experiment, Prinsenhof ‘makes the concept civil society operational’ (Prinsenhof 2007). The societal benefits consisted of structural creation of a large number of volunteer positions, helping mentally challenged to develop the skills to enter the regular labour market and a smaller need for professional health care (both in cure and in care) as a result of the developed support structure within Prinsenhof (Felius 2009).

MONITORING DESIGN

The aim of the monitoring was (1) to set up a lasting monitoring and evaluation infrastructure, (2) to monitor evaluate the activities, outputs, outcomes and impacts of Prinsenhof and (3) to support continuous improvement of Prinsenhof. The Prinsenhof ambition was to connect different stakeholders and be largely run by the community. In line with this ambition it was advised to set up a M&E team within Prinsenhof in which different stakeholders involved in the daily activities at Prinsenhof were represented. These included the proprietor of the nearby home for the elderly, members of the elderly council and people from Laurens, Pameijer and De Nieuwe Unie. This team would formulate, implement and use the M&E. This organisational set-up meant that the stakeholders themselves voice the issues and concerns in monitoring and evaluation, supervise the activities and implement (or supervise implementation of) the results. Through the process, they were expected to improve their self-determination, making it an example of empowerment evaluation (Fetterman 1994). The topics and methods for monitoring were determined by this monitoring team.

MONITORING IMPLEMENTATION AND RESULTS

Three types of M&E activities were identified: (1) action research, (2) evaluation research and (3) basic monitoring data collection like the number of visitors to the centre, rental, the number of volunteers, etc. Students of the Rotterdam University did a large portion of the work as part of their practical schooling assignments and they were supervised and guided by the M&E team. By autumn 2009 some 16 students were involved in these M&E activities and used a mixed method design including questionnaires, Q analysis and participatory observation. The implementation and results of the three types (action research, evaluation research and basic monitoring) of monitoring are discussed below.

The action research at Prinsenhof dealt with urgent issues that require short-term intervention. M&E was used to identify these issues and monitor the effects of interventions. By autumn 2009 four action research projects were running. The first was about the question how to create an effective organization that also has eye for the individual characteristics and motivation of volunteers. This was a key challenge for Prinsenhof where responsibilities were not yet clear in day-to-day practice, although they had been defined 'on paper'. The second was about improving local awareness about Prinsenhof. The third action research process was to understand the possibilities and boundaries of participation of the mentally challenged in Prinsenhof. This included the creation of new activities in which elderly and mentally challenged worked together. The fourth action research dealt with the culture within Prinsenhof. This topic was identified in the first meeting of the M&E team and was symbolized by a picture from the message board which showed how the logo of Prinsenhof was covered by all the different logos and messages of individual stakeholders. The key question was how to move from a building shared by different users to a centre with one strong, shared identity ('us, Prinsenhof').

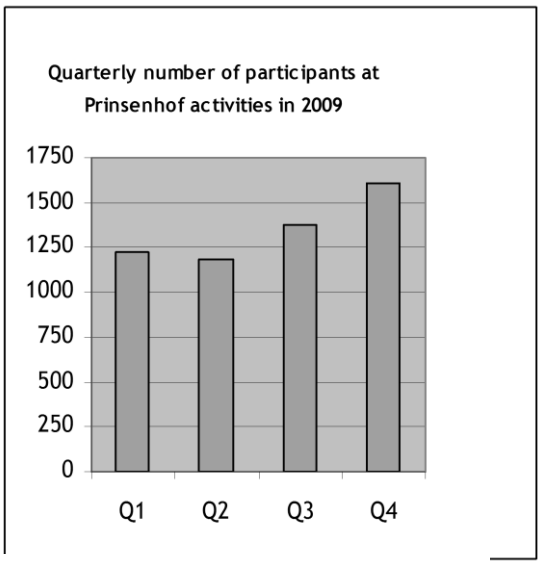

Figure 6.4 Participants of Prinsenhof activities

The evaluation of the effects of Prinsenhof at the outcome and impact level was methodologically challenging. The ex post evaluations were to provide evidence for the claims in the social business case which Prinsenhof piloted for TPLZ (as introduced in the previous section). The social business case was an ex ante evaluation of expected effects. It concluded that Prinsenhof had a positive capitalized social return on investment, in which every euro invested in Prinsenhof would lead to 2,3 euro of social benefits. Being an ex ante evaluation, this number was based on a large number of assumptions. Later evaluation of the real outcomes and impacts of Prinsenhof was needed to provide evidence for the business case (Felius 2009).

Important outcomes and impacts for evaluation were the effect of Prinsenhof on final well-being and care consumption through a positive effect on social cohesion and the effect of a Prinsenhof-based consultation office for early identification of health care needs on later use of health services. However, empirical validation of some assumptions in the social business case was not methodologically and practically possible for three reasons. First, some of the data needed was in the hands of different organizations, collected at other geographical scales or was difficult to collect with (standardized) measurement tools. Also evaluation-fatigue had to be prevented. Secondly, the activities within Prinsenhof changed continuously and the people who were involved in Prinsenhof may not have been representative for the full population of elderly. This made it difficult to make claims about the Prinsenhof impacts. Third, long-term causal effects of prevention were difficult to attribute to the often small interventions at Prinsenhof. An example was the consultation office located in the meeting centre. This office offered integral screening to signal health risks. The screening was followed up by an advice and a second screening, but because the intervention was relatively small and for a small group of people, effects on long-term health were difficult to prove. With respect to the consultation office, the monitoring advisory group advised to rethink the effect of the consultation office interventions and turn from impact evaluation to process evaluation (eg what did people do after receiving a screening from the consultation office).

The final type of monitoring activities constituted basic data collection to monitor the use of the Prinsenhof centre. This resulted in quarterly reports on the number of people using Prinsenhof (see figure 6.4 for totals), the ratio between elderly and mentally disabled in Prinsenhof, the amount of support given by professionals and financial data.

CONCLUDING REMARKS ON THE PRINSENHOF MONITORING

The final report on experiment Prinsenhof by the experiment leader concluded that the M&E aims were largely realized (Moree van Cappellen 2010). A M&E infrastructure was set up in the form of a M&E team of stakeholders and the advisory committee and was continued in 2010. A large part of the Prinsenhof outcomes and impacts were investigated and the M&E team and action research clearly contributed to the continuous improvement of Prinsenhof. As a side effect, lasting relations with two other care offices and Rotterdam University were established. By 2010, the innovative aspects and the knowledge generated within Prinsenhof were actually seen as a new source of income for the experiment. Presentations, tours and reports as well as on-going research efforts were expected to bring in additional funds.

With respect to the monitoring requirements from TPLZ and from the experiment itself, the social business case and ex post evaluation of Prinsenhof were both considered important. These M&E activities contributed to prolonging financing and support for Prinsenhof after 2009 (when TPLZ financing and support ended), although the centre had to continue on

a much reduced budget. According to the experiment leader, especially the social business case helped to convince stakeholders to continue their involvement with Prinsenhof. Developing the social business case brought different stakeholders together and offered a good argument to continue investing in Prinsenhof. The evaluation research by the M&E team complemented this social business case by providing evidence of these anticipated benefits of Prinsenhof.

On other topics the programme and project had different information needs. The TPLZ programme frequently pointed to the importance of stimulating (and monitoring) processes of broadening and scaling-up, but these issues were not considered as important by the Prinsenhof M&E team. This is not because there were no developments in broadening and scaling-up. A similar meeting centre inspired by Prinsenhof was developed in a nearby area (broadening), additional functions in Prinsenhof were realized (broadening), structural financing was realized (scaling-up) and bundling of different transition experiments in the Rotterdam region initiated (scaling-up). 'Success' however was defined differently by the TPLZ programme and the local M&E team. For the TPLZ programme Prinsenhof was an experiment within a larger health care transition. For stakeholders that were involved in Prinsenhof daily, success meant getting and keeping Prinsenhof financially and organizationally up and running. Initiating spin-offs or making Prinsenhof part of the dominant practices in the care sector was less of a concern to them. They were first and foremost stakeholders of Prinsenhof and not so much of a regional or national transition in health care.

6.6 ANALYSIS

This section analyses the case study with respect to the use of TMon (1) for a transformative programme, (2) in the mode of programme wide reflection, (3) the relation between project and programme monitoring and (4) the attempts to redesign the monitoring activities during the duration of the programme.

MONITORING IN A TRANSFORMATIVE PROGRAMME

The TPLZ strategy is presented as an example of a transformative strategy. Transformative strategies are described in chapter 4 as strategies that start out with local experimentation based on initial knowledge of (in the case of TPLZ) the care system, the programme identity and initial network. From this starting point the programme attracts commitment of new stakeholders. Over time increasing knowledge on the care system is gained, networks are created and tightened and a stronger sense of identity is constructed. This provides increasing means and, as more commitments are made, converging goals. Over time this is to result in a transition scenario including a vision on the desired care system.

Looking back, this proposed type of strategy has many similarities to the way TPLZ developed. The programme started with experiments from its existing network. The transformative approach was also recognizable in its attention to learning between experiments and the attempts to create a common language and a sense of shared purpose through tactical activities like learning sessions and thematic sessions. These tactical activities tightened the relations between experiments and helped identify generic barriers and lessons about the care system. After a year, the programme initiated a transition arena to develop a long-term vision on the desired care transition.

The initial lack of programme-level transition scenario in a transformative strategy meant that it was not possible to monitor the progress of experiments with respect to long term goals at sector-level. Instead, the TPLZ programme theory for individual experiments was used. In this theory each successful experiment develops through patterns of deepening, broadening and scaling up. The monitoring matrix made the patterns of deepening, broadening and scaling-up of

transition experiments more specific (see Van den Bosch 2010) and helped to embed these concepts in the structure, culture and routines of the programme. The monitoring matrix was used to stimulate reflection on these patterns as well as recording progress.

When the monitoring matrix was designed, the transition experts expected that new monitoring needs would develop in TPLZ over time. Chapter 4 suggested that monitoring in a transformative programme like TPLZ needs to focus on the development of converging goals and the continuous identification of new relevant knowledge, actors, developments and activities in the context of these evolving goals. New monitoring designs were therefore proposed to inform the selection of the second tranche of experiments new activities and strengthen the relation between the transition arena and experiments. However these additions were not implemented in the TPLZ programme. This is discussed in more depth in the subsection on redesign.

TPLZ developed in ways that sometimes did not match the proposed transformative strategy. For example, the first group of experiments did not influence which additional experiments were needed and the long-term transition scenario was developed in a parallel process (the transition arena), instead of bottom-up from transition experiments. This suggests that the proposed transformative strategy which formed a heuristic for the monitoring needs across time did not fully match the programme developments in practice. In part this is due to the project management orientation of part of the programme team and the programme commissioners. It seems that the idea of a transformative strategy (or bottom-up transition management) was not shared by the whole programme team and the programme board to the same extent.

The most important difference between the development of TPLZ and a transformative strategy was that the (financial) resources of TPLZ grew less over time, whereas theory on transformative strategy (coming from business management science) assumes that success leads to increasing financial resources. Within TPLZ the projects –whether successful or not- had to look elsewhere for new funds after the first years. The same can be said for the programme managers as also the TPLZ funding was limited in time.

MONITORING AS PROGRAMME WIDE REFLECTION

The monitoring matrix was developed for programme wide reflection. Programme managers confirm that it was used for reflection. It was also used for operational management information. The purpose for which it was used, depended on the programme manager and changing monitoring needs. Programme wide reflection is an instrument to stimulate on opening up like the articulation of new transition scenarios, identification of unanticipated sustainability issues, etc. Operational management information is used for closing down like tracking if changes develop as expected, converging on a single definition of sustainability effects, etc.

The TPLZ case study shows that a single monitoring design may be used differently by different programme managers. This could already be seen early in the design of the matrix. Already in the monitoring handbook however, the matrix was not only presented as an instrument for reflection but also as an instrument for accountability and communication. Different managers used the matrix in slightly different ways and to different degrees. The transition experts used the matrix to stimulate reflection at the project level. Sometimes it was solely used as an instrument to initiate a reflective dialogue. On other occasions the matrix was also used to structure (plan) the activities for the coming months (see table 6.1 as an example). Some managers preferred using the social business case (an instrument for closing down) over the

matrix, others not. The programme managers themselves recognized the diversity of individual approaches and considered this to be an asset. According to a member of programme management "*what the programme does strongly depends on the person you are talking to, each has its own focus and every focus seems to offer additional value*". This flexibility was possible because the monitoring design was not very explicit about its purposes and it was not implemented as the central framework.

The information needs for individual experiments changed over time. Reflection was considered more helpful at the start-up of experiments than in later phases when they needed to prove their advantages in order to attract more attention, support and resources. The monitoring needs shifted from opening up (programme side reflection) to closing down operational management information). The matrix was not designed for closing down and became less salient. For closing down other instruments like the social business case were more useful.

Last, there is the relation between the internal monitoring activities and other sources of information. Especially in internal use, monitoring needs to have an added value with respect to other formal and informal information flows. Contact between programme management and experiments intensified over time and became more specific. This meant that the matrix no longer seemed to provide new salient information for programme managers and standardized, systematic instruments like the seasonal talks were used less over time.

THE RELATION BETWEEN PROJECT AND PROGRAMME MONITORING

The relation between project and programme monitoring is explored in two ways: first by analysing how project information was used for programme management, second by comparing the information needs about projects from a programme and from a project perspective.

Project monitoring can be used by programme management to support individual projects to manage the portfolio (see chapter 4). The matrix appeared useful for project support. The seasonal talks that were observed, as well as the ex post interviews showed that programme managers used the matrix for reflection on the projects together with the project leaders. The matrix helped structure the project activities, assess project progress and identify new needs for project support. The cross-sections of the annual reports provided up-dates on the progress of each experiment in the portfolio. These up-dates confirmed the initial idea of programme management that the matrix can be used to track the progress of experiments.

Portfolio management is different from project support because it addresses the interplay between projects. Activities include the adding (removing) projects to (from) the portfolio, creating relations between projects and change agents and stimulating a shared transition scenario. The matrix was not used for this type of activities, nor was it intended to. With regard to adding or removing projects from the portfolio, the matrix did indicate which projects were more active and successful with regard to broadening and scaling up. But according to programme managers, these results formed an insufficient base to terminate project funding. The programme manager who developed the 2009 portfolio overview (see figure 6.3) no longer supported this use of the matrix a year later. She felt the matrix did not provide a sufficiently accurate and objective measurement of progress to compare experiments with a different character and that joined the programme in different stages of maturity. Other portfolio management activities like creating relations between projects in various meetings (ie learning sessions, thematic sessions) were not informed by systematic monitoring.

The project information needs by project leaders and by programme management only partly overlapped. In the case of TPLZ and the Prinsenhof experiment the main overlap was the need for evidence about the social benefits of the experiment. This was used by stakeholders in the experiment to get structural financing and other support of local care organizations. The programme used it as an argument about the wider potential of changes like Prinsenhof. There were also differences in information needs. Prinsenhof stakeholders used monitoring and evaluation to collect detailed and context specific information about Prinsenhof that was less relevant for the programme. The programme wanted information about processes of broadening and scaling-up which was less important for those directly involved in Prinsenhof.

REDESIGN

The TPLZ monitoring started with monitoring individual experiments. It was expected that over time, TPLZ would need portfolio and transition field monitoring and additional monitoring designs would need to be developed. Over time new monitoring activities at portfolio level were presented to the programme, but attempts to redesign the monitoring failed.

This may be due to different reasons like "*the often "last minute" and ad hoc interventions of DRIFT" (*Van den Bosch 2010) indicating too little co-production with other programme managers. Second, TPLZ developed routines for project support and needed more efficiency. This reduced the space to rethink and redesign the monitoring. After 2008, TPLZ expressed that the focus should be on exploiting the instruments already developed and not on developing new transition monitoring applications. Third, some of the monitoring needs expected from a transition management perspective did not surface like monitoring the interaction between operational, tactical and strategic activities. The orientation of TPLZ may not have been as 'transition management based' as the DRIFT researchers wanted. Fourth, the proposed programme level monitoring activities meant that programme management would monitor itself. Programme managers felt that this would not result in new information for them, nor were they obliged to monitor themselves.

In general, the TPLZ case warns us not to be overly enthusiastic of the amount of time and effort programme managers and others want to devote to monitoring and evaluation. Some of the developed tools like the monitoring matrix and social business case were used widely, but many other instruments were never implemented. Those instruments that (1) clearly addressed information needs that were important to programme management, (2) were enforced and (3) resulted in new information were implemented.

6.7 SUMMARY AND CONCLUSIONS

The programme TPLZ has a transformative strategy. In TPLZ individual projects or transition experiments were monitored. The theory of change used was that transition experiments contribute to a transition through the mechanisms of deepening, broadening and scaling up. These three mechanisms were monitored with respect to each of the three monitoring dimensions: transition scenarios, changes in culture, structure and practices and sustainability. This resulted in nine questions referred to in TPLZ as the monitoring matrix. This matrix had three functions: (1) it offered a format for regular and joint reflection on the project by project and programme managers, (2) it was part of the annual reporting format on project progress, which was used to assess individual projects and to make cross-sections of the entire portfolio and (3) was used at a meta-level to structure all the programme management instruments. The use of the

monitoring matrix was compared to other monitoring and evaluation activities of projects: the social business case which was an ex ante evaluation of its costs and benefits and the monitoring and evaluation activities within the Prinsenhof project.

The quality of the design can be described in terms of credibility, salience and legitimacy (see chapter 4). For reflection on the projects the matrix can be considered credible due to its one-on-one relation to deepening, broadening and scaling up. That the resulting information was qualitative and very project specific is not an obstacle for reflection at project level. However when the matrix was used beyond what it was intended for, credibility issues were identified as a result of the ambiguous nature of the questions in the matrix and the type of information that resulted from it. Therefore (not all) programme managers considered the matrix to be a good tool to distinguish successful from unsuccessful projects.

The matrix was used continuously to monitor experiments both at an individual and at a portfolio level. This sustained and active use is a sign of its salience. With regard to the salience criteria described in chapter 4, the matrix was descriptively and goal relevant, timely and operationally valid, especially in the first year. However as programme managers intensified project support over time, the monitoring information became less salient, because it no longer offered new information to the programme managers who were in regular contact with the individual projects. Aldo the monitoring needs changed from opening up to closing down.

The design was perceived as legitimate. An important strength of the matrix was its alignment to the programme's theory of change and values. The matrix was a format to monitor individual experiments related to the theory on deepening, broadening and scaling-up that was used intensively in TPLZ. The matrix aligned with several of the key values of the programme like the attention to learning and a transition perspective. According to the programme self-evaluation, it was *the* central monitoring framework and embodied the ambition of the programme to the extent that it almost became *"a logo for TPLZ"* (Vries, Wittmayer et al. 2010). With respect to the values and concerns in a specific project there is only a partial overlap with the values and concerns of the programme.

The introduction mentioned that this case study (as well as the next four case studies) aims to answer the question what we can learn about the TMon approach when it is applied in cases with (a) different programmes strategies, (b) different modes of monitoring, (c) multi-level monitoring, and (d) regular redesign of monitoring activities? These four issues in this research question -programme strategy, mode of monitoring, multi-level monitoring and regular redesign - are of course interrelated. They refer, respectively, to the context, roles and purpose, focus and changes over time of a transition monitoring application. In this section, the findings are integrated into the following lessons with regard to transition monitoring in TPLZ:

- **Using a transition theory that was also widely supported in the programme improved the usefulness of the monitoring.** The transition monitoring was based on the theory of deepening, broadening and scaling-up which was widely used in the programme. This enhanced the salience and legitimacy of the monitoring for the programme. The other way around, using these mechanisms in the monitoring helped to internalize these mechanisms in the programme and projects.
- **Programme wide reflection on projects was relevant within the initial phases of TPLZ's transformative strategy**. The monitoring matrix was used in the mode of programme wide reflection (opening up as an internal

programme activity). One of the first steps in a transformative strategy is learning about the strengths and weaknesses of different (operational) projects. The matrix was valued to support this process during the deployment phase of the programme. Joint reflection on the projects by programme and project managers helped build a personal relations.

- **Towards the end of projects, closing down was needed**. In later phases, the matrix was used less. Programme and projects had more interaction, which reduced the added value of a structured format for such interaction. Project managers needed closing down to ensure continued financing based on evidence of the project benefits as apparent by the monitoring needs of stakeholders in the Prinsenhof project and the programme support requested by the projects over the years).
- **Programme managers and project leaders have partially different information needs about projects.** Monitoring needs of projects and the programme only partially overlapped. The programme defined the contribution of projects to a sustainability transitions through patterns of deepening, broadening and scaling-up. Stakeholders in the Prinsenhof project (regarded as one the most successful within the programme), did not prioritize monitoring and evaluation regarding broadening and scaling-up, but focused on purely project internal developments. This implies that transition programmes may regularly need to impose monitoring activities on projects if they want information of the project's contribution to a transition. The monitoring needs of the programme and project overlapped with respect to the sustainability contribution of the project.
- **The project monitoring was of limited use for portfolio management.** TPLZ tried to create an overview of the portfolio through cross-sections of the annual reports, including the matrix. This way the development of projects towards realized sustainability benefits, broadening and scaling up could be monitored. However, it remained difficult to credibly aggregate the findings the individual annual reports and to identify common themes and compare individual projects. This is due to the nature of the questions in the matrix. The theory of deepening, broadening and scaling up was more helpful to describe and manage individual projects than to describe changes on transition field and programme level.
- **TPLZ largely developed as would be expected from theory on transformative strategies.** In many ways the development of TPLZ resembled a transformative strategy as described in chapter 4. It started with innovative operational projects, valued learning processes between these projects and used these to develop a transition scenario (a strategic activity) and discussions about structural barriers for a transition (a tactical activity). However, selection of new operational activities was not informed by these converging goals. Another difference with the proposed transformative strategies is that -in contrast to entrepreneurial activities- the financial and human resources do not grow as a result of successful programme management, but dwindle as programme dissolution comes nearer and the original budget is depleted.
- **Redesign of internal monitoring activities was complicated by increasing programme management routines and less added value attributed to programme-level monitoring.** A transformative strategy as described in chapter 4 also implies that selection of new operational projects but also the development of tactical and strategic activities is based on the lessons about previous projects. Attempts were made to design new monitoring activities to support these processes. These were not implemented. Instead links between

operational and tactical and strategic activities were made through personal contacts which –in the eyes of programme management- may have reduced the added value of programme monitoring. Programme management over time became increasingly efficient, structured and routine-based, reducing the room for new monitoring activities.

CHAPTER 7 TRANSITION SCENARIO DEVELOPMENT BY TRANSFORUM

***Evaluator**: "Some people state that without a clear sustainability and transition scenario, a programme can have little focused effect and transition monitoring can be of little use. Do you agree with that?"*

***Programme manager**: " This is a perpetual discussion between our programme managers. I both agree and disagree with the statement. […] TransForum does not have a clear picture about what sustainable agriculture entails and does not want to have one. Or even worse: reduce it to a list of criteria for projects. If you approach sustainable agriculture in that manner in order to be able to monitor it, you miss the very essence of the word. On the other hand we have said that one of the contributions of TransForum can be to develop a notion of sustainable agriculture. But how can you deal with this discussion and develop steering suggestions when you know you cannot measure it? "*

Interview with TransForum programme manager early in the programme, 2007

7.1 INTRODUCTION

The first year of monitoring activities in TransForum is described as part of the pilot cases in chapter 3. As described there, TransForum was a transition programme in sustainable agriculture that deliberately started without a transition scenario. Instead TransForum valued a strategy that emphasized bottom-up thinking and learning from projects, which would over time lead to a transition scenario and programme management did not consider critique of the involved transition experts about TransForum's 'vision shyness' as legitimate. After all, the programme had never intended to start with an explicit scenario (see textbox for a short summary of the monitoring pilot).

As a consequence of the pilot, the transition monitoring framework and underlying theoretical notions were modified in chapter 4. In this chapter 'transformative' strategies were presented as an alternative to the visionary strategies proposed in original transition management literature (Rotmans et al 2001; Loorbach 2007). A resulting design issue is how monitoring and evaluation can deal with this initial lack of transition scenario. The previous chapter (chapter 6) about the TPLZ programme largely bypassed the initial lack of transition scenario by focusing on individual projects and the composition of the portfolio. The role of transition monitoring to support the construction of a transition scenario at programme level is the core of this case[14].

[14] *This chapter is largely based on: Taanman, M., Wittmayer, J.M. and Diepenmaat, H., Monitoring on-going vision development in system change programmes, Journal on Chain and Network Science, 12 (2): 125-136, 2012*

Monitoring pilot in TransForum (2006-2007)

In the period 2005-2007, TransForum strongly focused on initiating projects. The innovation projects received far more attention than scenario development. The first monitoring report (Henneman 2007), recognized TransForum as being strong in exploring a range of local innovations but also that its potential to contribute to a larger transition process remained underexposed. The report concluded that the programme was less concerned with the question of how innovation projects could add up to a sustainability transition (Henneman 2007: 12). It was recommended to pay more attention to scenario building and learning about the current agriculture regime and sustainable futures.

The conclusions of the monitoring report were rejected by TransForum and they criticized both the process and the legitimacy of comparing TransForum to the transition management model which has a large emphasis on scenario-building. In terms of process, programme management was little involved in the initial pilot. This led to critique especially because the programme valued shared learning processes and therefore approached monitoring as a joint sense-making process. TransForum managers concluded that the tone of the report created an 'unconstructive' distance between monitoring and programme management . This lack of explicit scenario on what sustainable agriculture entails was a deliberate choice of programme managers. Programme managers argued that sustainable development was inherently political and discussions on what was *right* and *wrong* obstructed change processes in *more sustainable* directions. In their understanding, the role of the programme was not to define the right state of the agriculture system. They did however require this from individual project managers. The primary responsibility of programme management was to facilitate innovation projects that were in some aspects more sustainable than conventional practice.

This chapter describes the 2007-2010 monitoring activities in TransForum. These activities supported programme management in developing transition scenarios. The case study is based on participant observation, monitoring reports and ex post discussions with the involved programme manager. The monitoring activities themselves were based on regular reflection sessions by the monitoring team consisting of TransForum programme managers and transition experts, informal talks at events organized by TransForum and others, interviews with TransForum staff, a workshop with TransForum staff organized by the monitoring team and extensive review of programme documentation and other sector-related (policy) literature. The case study case explores four different aspects of the TMon approach:

- **Programme strategy.** Similar to TPLZ (chapter 6), TransForum follows a transformative programme strategy. It started with a focus on innovation projects, and later developed a transition scenario, based on the experiences within the projects.
- **Modes of monitoring.** Monitoring was conducted in the mode external reflection. The transition experts had the most influence on the framing, data collection and analysis, although (especially compared to the monitoring pilot), programme managers played an active role too.
- **Multi-level monitoring.** This case shows how monitoring was used to stimulate a transition scenario at programme level by drawing together information on different levels: project, programme level and transition field.
- **Regular redesign of monitoring activities.** This case describes three iterations of the monitoring activities. Each iteration had a different focus and goal.

This chapter starts with a short review of the relation between monitoring and evaluation and vision development or –in transition monitoring terms- the development of transition scenarios. The third section describes the TransForum programme. An overview of the monitoring activities is presented in section 7.4 after which the three iterations of

monitoring design, implementation and results are described in sections 7.5-7.7. The case is analyzed with respect to the programme strategy, mode of monitoring, multi-level monitoring and redesign in section 7.8, before some initial conclusions are drawn in section 7.9.

7.2 THEORETICAL CONTEXT: SCENARIOS IN EVALUATION STUDIES AND TRANSITION PROGRAMMES

Developing transition scenarios or visioning, is seen as a key policy instrument in the governance of transitions (Loorbach 2007; Rotmans et al 2001), systemic innovation policies (Hekkert et al. 2007; Smits and Kuhlmann 2004) and sustainable development (Weaver and Rotmans 2006; Meadowcroft 2007). Scenarios offer an integral frame to orient short-term actions and evaluate programme development. Due to the complexity and multi-actor nature of transitions, a realistic and attractive scenario can only develop and become known through the interactive process of programming itself. This presents a paradox for innovation programmes: without a scenario it is difficult to select, monitor and evaluate the programme activities and projects, but without doing these projects and programme activities, it is difficult to formulate an appropriate scenario. This makes scenario development an important instrument within programme management, and the resulting scenarios an important output.

At the same time, scenario development is sparsely addressed in programme monitoring and evaluation. This may be attributed to the traditional distinction between policy *formulation* (including activities like problem structuring, scenario development, goal definition and planning), policy *implementation* and policy *evaluation*. Evaluation research on system change programmes regularly approaches the articulation of a programme theory as an evaluation design issue, rather than a topic for evaluation itself (compare the overview of Rogers 2008).Yet, as Georghiou and Keenan (2005: 762) argue: "*most evaluations include some form of formative perspective on the future and often have to consider the future implications of the measures they seek to assess. In turn, [visioning] activity generally needs to be informed by a thorough understanding of the past".* Moreover, when dealing with complex problems strategy making, implementation, monitoring and evaluation become recursive and continuous processes. In system change programmes it therefore makes sense to also include scenario development in the monitoring and evaluation process. An inspiring, supported scenario can be regarded as an important output of a system change programme.

In their discussion of foresight activities evaluations Gheorgiou and Keenan (2005) provide relevant lessons that are well in line with previously discussed issues on scenario development as a multi-actor learning process. First, they stress that the logic behind scenario development should influence the evaluation. If scenario development is seen as an instrument to foster network building, learning and co-ordination, this should be reflected in both the evaluation criteria and in the evaluation process. Secondly, they stress that the impact of a scenario cannot be assessed without addressing the process and context of the scenario development. This includes its relation to other policy instruments (like innovation pilots), the unit of aggregation, the motivation for evaluation and the broader strategic and policy context.

7.3 TRANSFORUM

TransForum (2008a: 10) described its development as follows: 'The programme has evolved from a loose collection of projects into a coherent entity looking to the future. Focus has been introduced, which has in turn mobilized and inspired

people and organizations'. Looking back, a member of TransForum staff described Metropolitan Agriculture as being strongly based on learning processes regarding innovation projects[15].

In 2003 the Dutch government initiated the BSIK (Besluit Subsidies Investeringen Kennisinfrastructuur) arrangement under which 37 programmes were funded to strengthen the Dutch knowledge infrastructure with respect to 5 key themes, one of which was sustainable system change. As one of the system change programmes, TransForum was initiated to support the transition to more sustainable agriculture. The programme had two objectives: (1) developing a more sustainable perspective for the Dutch agro-sector; and (2) contributing to the necessary change in the knowledge infrastructure to develop such a perspective from 2005-2010 (TransForum 2007, 2008b). TransForum received €30 million from BSIK funds and an equal amount from companies, research institutes and other stakeholders participating in the projects. TransForum co-financed projects in three interlinked categories: 35 innovation projects, 38 learning projects and 25 research projects. The learning projects reflected on and brought together the lessons from innovation projects and included a range of monitoring activities. The large number of learning projects is proof of the emphasis of TransForum on reflection and learning. Next to the monitoring project on programme-level transition scenario development, there were other forms of monitoring and evaluation that focused on the project level. These included project process monitoring, a project learning history, 'Networked Learning – Learning from Networks' (Hoes 2011) and were based on reflexive monitoring as described by Regeer (2010) and Van Mierlo et al. (2010). In the course of the years, TransForum as a programme evolved and changed its focus from supporting projects to learning to an emphasis on building a coherent transition scenario.

Two years after the programme was initiated, TransForum performed a self-evaluation for the obligatory mid-term review (TransForum 2007a). Following up on this evaluation, TransForum outlined a new work plan (TransForum 2008b) for the remaining three years, in which developing a transition scenario became a central activity. TransForum considered the mid-term review a good moment to take stock of programme development so far and create a turning point from a phase of stimulating diversity to a phase of stimulating convergence. Both the external pressure of the work plan and the monitoring findings of the pilot contributed to an increasing focusing on scenario development by programme management.

By 2010 TransForum had developed a transition scenario (or in their own terminology *guiding idea*) of 'Metropolitan Agriculture'. This transition scenario connects the urban area to agriculture by emphasizing how they are complementary and their need for each other for a sustainable development of both (TransForum 2010a). The monitoring activities supported the transition scenario development process.

Metropolitan Agriculture is a scenario based on connecting urban and agricultural developments. This involves connections between different types of agriculture, connecting business models to sustainability and connections to the urban environment. Agriculture and cities are to stop looking at each other as a threat but as a possibility to create social, economic and environmental value to their mutual benefit.

According to TransForum, Metropolitan agriculture is the only option to realize sustainable agriculture in the Dutch context. By connecting agriculture to the urban environment, urban dwellers are reconnected to the land and their food.

[15] *Interview, 23 March 2010, Zoetermeer.*

Their knowledge about agriculture increases and they can more directly influence and control that agriculture contributes to social, economic and environmental values. This reduces the unsustainable character of current agriculture in which for example consumers value animal welfare but do not let that influence the choices they make in the supermarket. Metropolitan agriculture is to restore a national sense of pride in agriculture. Pride that the Dutch "not only live in a country with the most advanced and complex agro-structure and knowledge, which is also visible in the direct living environment and connected to the goal of sustainable development" (adapted from Wittmayer et al, 2010b).

7.4 OVERVIEW OF THE MONITORING ACTIVITIES

Transition monitoring in TransForum was an iterative process, where theory development and practical application went hand in hand. Three iterations took place over the period 2007-2010. The monitoring included regular formal and informal reflective discussions with both senior and junior programme managers. It was in this setting that regularly the focus of transition monitoring activities was reformulated (see table 7.1). Each iteration is described in the following sections with respect to the monitoring design and its results.

Table 7.1 Overview of programme monitoring activities at TransForum

Iteration	***Duration (approx.)***	***Focus of programme monitoring activities***
I	2007-2008	Report (Wittmayer et al. 2009a): - Source: Literature review, review of project documentation, informal talk, reflection sessions with TransForum programme manager, workshop with TransForum staff, participant observation during TransForum meetings - Focus: Development of a transition scenario, with an emphasis on the following indicators: 1. The TransForum scenario as a transition scenario 2. Fit of the TransForum scenario and the project portfolio 3. Fit of the TransForum scenario and other contemporary scenarios of sustainable agriculture
II	2009	Report (Wittmayer et al. 2010a): - Source: Review of policy documents and project documentation, informal talk, reflection sessions with TransForum programme managers - Focus on indicator 3 by comparing the emerging transition scenario with other scenarios in the field of agriculture in the Netherlands
III	2010	Report (Wittmayer et al. 2010b): - Source: Review of project documentation, interviews with TransForum staff, reflection sessions with TransForum programme managers - Focus: Enriching and clarifying the Metropolitan Agriculture scenario though dialogue with TransForum programme staff.

7.5 FIRST ITERATION: TOWARDS A TRANSITION SCENARIO

DESIGN

In line with the new programme strategy and the initial monitoring findings (Henneman 2007), the monitoring activities during this iteration stimulated further development of a transition scenario. In a session with programme management, three aggregated indicators were chosen to monitor scenario development:

(1) the development of the programme transition scenario;
(2) alignment between the programme transition scenario and project-level transition scenarios, and;
(3) the added value of the programme transition scenario over transition-field level transition scenarios.

A transition scenario was defined as a scenario which describes fundamental changes in the culture, structure and practices of the agricultural sector. Each scenario is described with respect to ten criteria. The first four criteria provide a basic description of the scenario with regard to the problem perception (1), the long-term vision (2), the transition pathways (3) and whether these three are clearly related (4). The next two criteria describe the sustainability of the scenario: existing sustainability notions (5) and manifest unsustainability (6). This last criterion was added because TransForum was reluctant to formulate a positive definition of sustainability (what sustainability should be), but did have a more clear negative definition of sustainability (what is currently *un*sustainable). The last four criteria describe transition scenario based on transition management literature. The scenario should describe the role of different actors in agriculture an should also be developed by these different actors (multi actor, 7). The scenario should be explicit both about the long-term changes and the short-time change (multiple timescales, 8). It should describe changes in the economical, socio-cultural and environmental domain (multi-domain, 9). Last, it should describe the relation between developments at different geographical scales (10). The score on these ten criteria could be used to monitor the scenario development within TransForum. These criteria could also be used to compare the TransForum scenario to other scenarios in the transition field (indicator 3) and discuss its added value for the sector.

RESULTS

With the framework in place, the three indicators were described qualitatively with an analysis of internal and external programme documentation, reflection sessions with programme managers and participant observation during programme meetings. The findings were reported in a monitoring report (Wittmayer et al. 2009a) and discussed with programme staff in a scenario development workshop in January 2009.

Indicator 1: the development of the programme transition scenario

During the first years, TransForum was in a continuous search for its own role in a transition to sustainable agriculture. Therefore, the first programme documents were more concerned with supporting individual projects than with a transition scenario for sustainable agriculture in the Netherlands. This changed in 2008, when the concept of 'Metropolitan Agriculture' was introduced in programme documents. Later that year, TransForum staff defined 'Metropolitan Agriculture', the resulting state of the agricultural system, as: 'a deliberately designed system of intelligently connected production sites that use the available resources, conditions and infrastructure in metropolitan areas to produce material and immaterial demands for the same metropolitan area'. Notwithstanding this early definition, the transition scenario was still seen by programme management as a transition scenario in development at a 'TransForum Scientist Day' in January 2009. Although the desired state of sustainable agriculture was largely left open, the current state and problems of the agricultural system were well defined. Next to widely recognized problems of Dutch agriculture as a result of over specialisation and intensification, the programme documents also took issues like urbanisation and a growing middle class with changing needs in terms of food and green space into account. During the transition scenario development workshop, TransForum staff also voiced more cultural, institutional and actor-related problems in agriculture like moral resistance against agro-parks, a lack of out-of-the-box thinking, shifting responsibilities and a focus on technological

fixes. The workshop stressed that the future of Dutch agriculture required bridging current dichotomies like connecting green space and urban functions, new forms of cooperation and changing roles of actors.

Indicator 2: alignment between the programme transition scenario and project-level transition scenarios

For this indicator, the transition scenarios of individual projects were compared to the programme scenario. Due to a lack of information and access to project level information, the monitors resorted to existing documents and conducted different analyses. These included a qualitative analysis and comparison of short project descriptions against the programme scenario, a more in-depth qualitative analysis and comparison of two randomly selected projects from each of the three project clusters (vital coalitions, multifunctional rural areas and international agri-knowledge networks) and a quantitative comparison based on the ten criteria for transition scenarios.

Analysis showed that the emerging transition scenario of Metropolitan Agriculture had a good fit with the largest part of the project portfolio, not at least because it was largely constructed in a bottom-up process. The analysis also illustrated that Metropolitan Agriculture provides cohesion to the variety of project scenarios and that there was potential to further enrich the programme transition scenario based on project-level scenarios. Although the programme learned from the projects the projects could not yet learn about the emerging programme scenario as it had not been communicated, according to a project-level facilitator. The scenarios of six projects which were analysed in depth showed no explicit time path and half of them did not specify which changes needed to take place on sector level and/or did not address the full scope of sustainability in terms of people, planet, profit.

Indicator 3: the alignment between the programme transition scenario and transition-field level transition scenarios.

For indicator three, the emerging transition scenario of TransForum was compared with transition scenarios on (sustainable) Dutch agriculture drawn up by the Ministry of Agriculture, Nature and Food Quality in 2002 and 2008 and other sectoral regime players (Borgstein et al 2007). This was done by describing a number of transition scenarios qualitatively with respect to the criteria for transition scenarios. The analysis showed that current transition scenarios were not sector-wide, but focused on sub-sectors like animal husbandry or arable farming and were often formulated in rather abstract terms. There was no clear description of what sustainability entailed or what changes were expected from different actors.

The analysis indicated that the sector-wide transition scenario of Metropolitan agriculture could add value to the broader debate about long-term change in agriculture. Recommendations for the development of the programme scenario that followed from the descriptions of the other players were to be more specific about aspects of sustainability and to address the links between agriculture and other societal systems as well as the relations with other countries.

The recommendations of this iteration mainly concerned issue on which the emerging transition scenario could be strengthened by connecting it to lessons and scenarios of innovation projects and other actors in the transition field.

7.6 SECOND ITERATION: ENRICHING THE TRANSITION SCENARIO

In 2009 TransForum took up activities to develop the notion of Metropolitan Agriculture further. Along with detailing the scenario Metropolitan Agriculture for the first time to outsiders of TransForum, the annual report 2008 connected the

innovation projects to the emerging scenario (TransForum 2009). This was done by pointing to the main common denominators in the way the projects contribute to the scenario: removing borders between activities, creating new knowledge flows, working on institutional barriers. In 2009, the TransForum team worked out the scenario, which led to publication of the Metropolitan Agriculture brochure in February 2010. During 2009 the "scenario concerning Metropolitan Agriculture– the complex relationship between our urban environment and agriculture – has been brought into sharper focus" (TransForum 2010c). In december 2009, the official website of the international network on Metropolitan Agriculture, the MetroAg Innoversity, was launched[16].

DESIGN

In discussions between transition experts and programme management it was agreed that the programme monitoring activities were to explore the relevance of the emerging scenario for the transition field. The goal was to enrich and substantiate Metropolitan Agriculture by analysing, describing and comparing it to other scenarios (Wittmayer et al. 2010a). This analysis of scenarios in the transition field filled in a white spot within the programme where the majority of learning activities involved the project level.

RESULTS

Monitoring experts and programme management agreed that the 2009 programme monitoring activities were to explore the relevance of the emerging transition scenario to societal transition scenarios and the further development of the programme transition scenario

Indicator 1: the development of the programme transition scenario

TransForum had taken up activities to develop the notion of Metropolitan Agriculture further and produced six documents regarding Metropolitan Agriculture in 2009 alone. The transition scenario was shared for the first time with outsiders of TransForum in detail and the annual report 2008 connected the innovation projects to the emerging transition scenario by pointing to common denominators like removing borders between activities, creating knowledge flows and working on institutional barriers and interventions (TransForum 2009). The TransForum team specified the transition scenario, which led to publication of the Metropolitan Agriculture brochure early 2010 (TransForum 2010a). According to TransForum (2010c) the 'vision concerning Metropolitan Agriculture– the complex relationship between our urban environment and agriculture – has been brought into sharper focus'. In December 2009, the official website of the international network on Metropolitan Agriculture, the MetroAgInnoversity, was launched[17].

In terms of structure, the transition scenario on Metropolitan Agriculture was defined as connecting sub-sectors, actors along the production-consumption chain and the broad societal basis for an agriculture that spans city and rural areas. Envisioned cultural changes described combining economic profit with broader societal goals, a new understanding of 'farmerhood' including their linkage with consumers. Changes in practices included a larger variety of products and services offered by farmers including non-agricultural services like water retention, day care for children or handicapped, tourism and a strong focus on cooperation amongst different parties in the agricultural field. This meant that the scope of

[16] *TransForum website http://www.TransForum.nl/nieuwsarchief/307-nieuwe-website-metroag-innoversity (accessed 14 May 2011)*

[17] *TransForum website http://www.TransForum.nl/nieuwsarchief/307-nieuwe-website-metroag-innoversity (accessed 13 January 2012)*

Metropolitan agriculture covered all 14 themes (although this does not describe the degree of change implied or the clarity of the changes described), see table 7.2.

Indicator 3: the added value of the programme transition scenario over transition-field level transition scenarios.

A more thorough survey of transition scenarios for agriculture was conducted. Slightly more than 50 vision documents on the future of the Dutch agricultural sector of universities, civil society organizations, research institutes or government agencies, published between 2001 and 2009, were identified. Most of them focused on a subsector or one policy issue and some were considered to be outdated. Monitoring experts and managers selected six transition scenarios that seemed particularly relevant. Three of these transition scenarios were already described in the previous monitoring activities. This left three ambitious integral transition scenarios on the future of Dutch Agriculture for comparison with Metropolitan Agriculture as described in programme documents dated from 2009. The other three transition scenarios were drafted by an NGO (Stichting Natuur and Milieu (SNM) [Foundation Nature and Environment]) and two research institutes (Centrum voor Landbouw and Milieu (CLM) [Centre for Agriculture and Environment] and the Landbouw Economisch Instituut (LEI) [Agriculture Economic Institute]). Each reference in these four transition scenarios to the current and desired state of the agricultural system and to sustainability was identified. The results were coded, resulting in 14 main themes for change in agriculture, related to the culture, structure and practice of agriculture. This allowed comparison between the societal transition scenarios and the TransForum transition scenario.

Table 7.2: Changes implied in the different transition scenarios. An X indicates changes explicitly mentioned (Wittmayer et al. 2010a: 37)

	Scenario 1 (LEI)	***Scenario 2 (SNM)***	***Scenario 3 (CLM)***	***Scenario 4: Metropolitan Agriculture***
Structural changes				
Policy	X	X	X	X
Energy	-	X	-	X
Knowledge infrastructure	-	-	-	X
Product chains	-	-	X	X
Market	-	X	X	X
Spatial	X	X	X	X
Demographics, resource prices and other Macro-developments	-	-	-	X
Sector boundaries	X	X	X	X
Cultural changes				
'being a farmer'	X	X	X	X
Thinking based on short-term profits	-	X	X	X
Role of agriculture in society	-	X	X	X
Practices				
Environmental effects of farming	-	X	X	X
Coordination and cooperation	-	-	X	X
Farming practice	X	X	X	X

The comparison of the four transition scenarios along the 14 themes (see table 7.2 for an overview) shows that the Metropolitan Agriculture covers more themes than the other transition scenarios and is in this sense more complete. Themes like coordination and cooperation and different farming practices have been described in detail, whereas other themes like policy, environment and market remained rather vague. Here, inspiration could be drawn from the other transition scenarios. A distinguishing feature of Metropolitan Agriculture is that it describes sustainability not only as avoiding negative impacts (e.g. reducing sulphate emissions) but also as realizing positive impacts (e.g. creating new healthcare services in rural areas).

The monitoring report concluded that Metropolitan Agriculture was comparatively complete regarding the desired change and positive in the way it framed the challenge for the sector as a whole. This makes the TransForum transition scenario a valuable addition to existing transition scenarios. On the basis of the analysis, it was recommended to describe the transition scenario in a more inspiring way, to further define aspects like policy and environment, to specify the roles of the various actors and explicitly describe what should change, when and why. It was also suggested to communicate the added value of the TransForum transition scenario in relation to the other transition scenarios.

7.7 THIRD ITERATION: CONSOLIDATING THE SCENARIO

DESIGN

The last monitoring iteration concerned a period of half a year, with the programmes operational activities ending in December 2010. In this period the programme tried to take stock of its accomplishments. Based on the recommendation of the earlier report, it was chosen to use monitoring in this process in order to converge on a more detailed and widely supported vision.

RESULTS

Through eight interviews with TransForum staff in March 2010, their tacit knowledge about what Metropolitan Agriculture entails was made explicit. The outcome, based on the interviews and a review of programme documentation was presented as a societal perspective on Metropolitan Agriculture (Wittmayer et al. 2010b). This meant that monitoring activities strongly focused on indicator one. Based on the interviews and documents the transition towards Metropolitan Agriculture was defined on 16 different themes, largely the same themes as used to compare the TF vision with other societal visions in the previous iteration. In the first half of 2010, TransForum also published a Metropolitan Agriculture brochure (TransForum 2010a) and four short movies illustrating the different manifestations of the vision[18].

7.8 ANALYSIS

The monitoring activities in TransForum help to explore (1) the use of transition monitoring with respect to monitoring in a transformative programme, (2) monitoring as external reflection, (3) monitoring across different levels and (4) regular redesign of monitoring.

MONITORING IN A TRANSFORMATIVE PROGRAMME

This case shows that TransForum is more about the process of discovering than about implementing a transition scenario. Through continuous learning and experimenting a transition scenario about sustainable alternatives to current unsustainable agro-food regimes emerged.

Developing a programme-level transition scenario on long-term sustainable agriculture was not the first priority at the start of the programme. In 2005 and 2006, the focus was on projects and visioning was a bottom-up process in which programme management deliberately created room for a diversity of transition scenarios at project level. From 2007 on, programme managers became engaged in a constructing a transition scenario by drawing on elements of existing visions both from project level and from societal level, embodied in the then open concept of Metropolitan Agriculture. The resulting transition scenario about sustainable agriculture helped to provide more structure to the programme including a reformulation of project-level goals. Over time this transition scenario of Metropolitan Agriculture became more detailed and was increasingly used to advocate sector-level change. The role of TransForum changed accordingly from focusing on individual project implementation and facilitation, to deliberately instigating portfolio and network level learning (i.e. across individual projects and change agents), to becoming a change agent oriented at the larger dynamics

[18] *See TransForum website: http://www.TransForum.nl/nieuwsarchief/327-nieuw-vier-korte-filmpjes-die-verschijningsvormen-metropolitane-landbouw-illustreren (accessed 13 January 2012)*

of the agro-food system. Towards programme dissolution, the programme focused on converging on a single, detailed transition scenario.

Unlike the pilot in which the lack of scenario was criticized, the later monitoring activities observed and supported the construction of a transition scenario throughout the years. Through three iterations transition monitoring helped clarify the scenario on Metropolitan Agriculture. The first iteration explored and compared transition scenarios at project, programme and transition field level. The second iteration identified key themes for a transition scenario by a more in depth comparison of the TransForum scenario and that of other actors in the transition field. The third iteration discussed these themes with programme managers and made the Metropolitan Agriculture concept operational with respect to the identified themes.

MONITORING AS EXTERNAL REFLECTION

In the pilot a fully detached role of the monitor was chosen in which indicators derived from theoretical frameworks that were new to the programme were used to assess programme process. The lessons learned from this pilot resulted in the need for a different monitoring framework. The discussions with the monitoring team on the importance of transition scenario development have helped sensitize TransForum to transition scenario development. Monitoring results were used to discuss ways to improve the transition scenario through additional workshops and other meetings. After the pilot the relation between monitors and programme managers "*changed 180 degrees*" according to both programme managers and monitors.

The monitoring in the first and second iteration was external reflection. Transition experts took the lead in design, data-collection and analysis. Monitoring supported a process of opening up by describing a wide range of scenarios at project and transition field level. The mode of monitoring changed over time. The final iteration may also be described as management information; monitoring was more internalized and oriented at closing down. In this final iteration, programme managers were asked to describe the meaning of Metropolitan agriculture with the purpose to close down (converge) on a shared understanding of the transition scenario. The results of these interviews made themes that were earlier identified as being under defined explicit. This mode of monitoring was chosen to let the earlier monitoring results land in the programme. This changing mode of monitoring also fits the phase that the programme was in. The last iteration took place in a phase when TransForum was appraising its results and preparing for programme dissolution. A definitive version of the transition scenario showed that the programme reached its original goal to develop a more sustainable perspective for the Dutch agro-sector.

External reflection by transition experts was expected to make easier use of transition theories (see chapter 5). In the case of TransForum this was transition management theory. Given the programme's earlier identified unease with transition management theories, some of the more controversial aspects were downplayed. For instance transition management's emphasis on radically innovative activities and focus on frontrunners only were not used as indicators for the transition scenario. To illustrate this point: the final report of TransForum noted that the programme had acquired the necessary characteristics to support transition processes but that this was often not 'the result from top-down application of a generic concept of transition management, but by bottom-up providing meaning to learning experiences' (TransForum 2011). Apparently, also in external reflection the theoretical framework of the monitoring needs to be sufficiently aligned with the programme theory.

MULTI-LEVEL MONITORING

This case study shows how information from different levels was integrated to support the development of a transition scenario. In all monitoring activities the current state of TransForum's scenario was described and compared to scenarios of other actors in agriculture. Three indicators were used and these directly follow from the different levels in the TMon approach. The indicators were (1) the development of the programme transition scenario, (2) alignment between the programme transition scenario and project-level transition scenarios, and (3) the added value of the programme transition scenario over transition-field level transition scenarios.

Only in the first iteration all three indicators were monitored. In the second iteration the monitoring focused on the relation between the programme and societal transition scenario, while most programme management activities focused on the project level. Reflecting on the context in which the monitoring activities took place, several reasons for this difference in focus can be considered. Firstly, TransForum programme staff at start was wary of granting the monitoring team access to their projects, reasons being that a number of other researchers was already involved at project level. Secondly, experiences of the monitoring experts with other system change programmes and their theoretical background made them inclined to stress the importance of the larger context in which the programme operated (Wittmayer et al. 2009b). These differences between the monitoring experts and programme managers may have helped to balance out the scenario development process by generating attention for areas otherwise overlooked.

REDESIGN

In each of the monitoring iterations, programme managers and transition researchers renegotiated which information was salient to the scenario development activities of that particular period. Continuity was provided by using the same three aggregated indicators in all monitoring activities.

7.9 SUMMARY AND CONCLUSIONS

The case study shows how TransForum, a programme with a transformative strategy, was engaged in a continuous process of scenario development throughout its existence and how monitoring contributed to this process. Different transition scenarios at project, programme and transition field level were monitored and compared. The discussions with the monitoring team on the importance of developing a transition scenario have helped sensitize TransForum for this subject. Monitoring showed ways in which the programme's scenario could be improved and resulted in recommendations and workshops in which the implications were discussed. These discussions also set the agenda for subsequent monitoring activities. Initial problems with salience and legitimacy were overcome in TransForum by staying close to the programme managers and strategy. The credibility of the monitoring results and recommendations was sufficient.

Seven lessons about transition monitoring in TransForum can be drawn. The first three concern lessons on why the monitoring activities in this chapter were quite successful, whereas the initial monitoring pilot described in chapter 2 failed.

- **TransForum's transformative strategy resulted in monitoring needs to support the development of a transition scenario.** In the monitoring pilot TransForum was criticized for not having a transition scenario and producing a sector-wide agenda. This critique was neither considered to be salient or legitimate, because the programme chose for a transformative strategy at the start of the programme. Such a strategy implies that transition scenarios are developed over time as a result of learning processes at programme and project level. Later monitoring activities that contributed to this process were perceived as salient and legitimate
- **Co-production was essential**. In the pilot, an external transition expert reflected on the programme without including the programme manager in the monitoring process. The programme manage, who saw transition monitoring as a sense-making process was critical of this and rejected the report. In later monitoring activities, programme management and experts defined the focus of the monitoring activities and discussed its implications together. This changed the relation between experts and managers '180 degrees' .
- **Transition management was of limited use as a theoretical frame in TransForum**. The tone of the pilot was very critical and based on a transition management perspective. Programme managers distanced themselves from transition management with its focus on starting out with a transition scenario, frontrunners and radical innovativeness. In later monitoring activities, only less controversial aspects of transition management were used as a theoretical framework. These aspects were that transition scenarios should connect different actors, domains, geographical and temporal scales. These aspects were also considered important by the programme. As a result the reflections were less critical, but more useable.
- **Monitoring redesign is possible without fundamental changes in the design**. Redesign of transition monitoring is expected in the TMon approach. Redesign was successful in TransForum without completely changing the monitoring design. By continuously using the same three aggregated indicators in the monitoring activities and only changing the level of detail and underlying indicators, continuity and flexibility were in balance.

- **A clearer transition scenario was used to re-assess the project portfolio.** In line with the expectations about transformative strategies, the development of a clearer transition scenario at programme level lead to a re-assessment of the project portfolio.
- **External reflection was beneficial halfway during the programme, towards the end internalizing and closing down were needed.** The first and second iteration were conducted in the mode of external reflection. This external reflection focused on transition scenarios within the transition field, whereas the programme managers at the time focused on the project and programme level. The external mode may have helped to focus on areas outside the direct view of daily programme management. Towards programme dissolution, it was important to stimulate ownership and convergence within the programme of the transition scenario. This scenario was an important result of the programme. This required monitoring to be conducted in a more internal setting oriented at closing-down, referred to in chapter 5 as the mode of management information.
- **Multi-level monitoring benefitted scenario development**. Monitoring the transition scenarios developed at project. Programme and transition field level helped to synthesize lessons at project level within the programme, and stimulated a programme scenario that was more integrated, clear and innovative than existing scenarios in the transition field.

CHAPTER 8 TRANSITION DYNAMICS IN THE GAS SYSTEM

"The Netherlands aspire to be the cleanest and most innovative gas country in Europe. The Dutch starting position is excellent: a hub in North-West European gas transport and a well-developed home market with all the infrastructure and knowledge this brings. This creates a strong base for Dutch entrepreneurs and knowledge institutes to take up an internationally distinguishing position. Platform New Gas supports and points the way to innovative and promising directions. […]. Who chooses new gas now, will lead in the future."

Mission of Platform New Gas, 2008

INTRODUCTION TO THE CASE

This case study is about a monitoring activity on the transition dynamics in the Dutch gas system for platform New Gas. In 2008, this platform was one of the seven platforms of the Dutch energy transition programme. This programme is one of the main empirical examples of transition management (Loorbach, 2007; Rotmans and Kemp, 2011). A platform from the Dutch energy transition programme was chosen because the monitoring pilots described in chapter 3 concluded that additional cases were necessary to (1) explore the use of TMon in monitoring the dynamics and sustainability in the transition field and (2) explore more explicit use of transition theories in programmes that were explicitly based on such theories. Based on these starting points, the platforms and working groups in the ETA were analyzed and compared. Platform New Gas was selected because it had recently finished a new transition scenario which included non-technical aspects and its transition pathways have a relatively large scope including energy production, distribution and energy use. This means, that in contrast to the other cases, there was no initial and explicit demand for transition monitoring in the platform[19].

This case explores the use of the transition monitoring approach in the following context:

- **Programme strategy.** The platform had a visionary programme strategy. It started out by developing a vision on the future of the gas system as part of a sustainable energy supply. This vision was used actively to influence policy makers and actors in the gas system. To realize this vision, five transition pathways were formulated, each promoted by a different working group and connected to a range of transition experiments. Throughout its existence from 2002-2011 the platform itself focused on strategic and tactical activities and created support for transition experiments.
- **Modes of monitoring.** This is a case of monitoring in the mode of external reflection. Monitoring was done by an external transition expert, responsible for the theoretical framework, data collection and analysis. It is still

[19] *My involvement in the monitoring activities for platform New Gas is larger than in the other cases. I approached the platform, developed the indicators, did the data-collection and analysis and presented the results.*

considered co-production because the focus was determined in discussions with the platform secretary and recommendations were developed with the members of the platform.

- **Multi-level monitoring.** This case focuses on the relation between programme and transition field monitoring. Different transition scenarios within the gas system were monitored, including the corresponding changes in culture, structure and practices and sustainability implications.
- As the monitoring was a one-off activity, the case presents no information **on regular redesign of monitoring activities**.

This chapter is structured as follows. Section 8.2 briefly describes the history and ambitions of the platform. The monitoring design is described in section 8.3. Its implementation and analysis are described in section 8.4. Section 8.5 describes the discussion of these results with the platform. The next section (8.6) analyses the case with respect to monitoring a programme with a visionary platform, external reflection and multi-level monitoring. Section 8.7 presents the main lessons and conclusions.

8.2 PLATFORM NEW GAS

The Dutch energy system is unsustainable. It is largely based on fossil fuels. Only the UK, Belgium and Malta produce less renewable energy in the EU[20]. Furthermore it is home to some of the largest refineries and gas industries in Europe and energy prices for households are some of the highest according to Eurostat. Thanks to the domestic natural gas (NG) supply, especially the large gas field under Slochteren, the Netherlands is still relatively independent from energy imports compared to the rest of Europe, although the reserves are dwindling.

The platform New Gas was present from the start of the energy transition approach (ETA) that was adopted in Dutch environmental policy plans in 2001 (VROM 2001). The ministry of economic affairs announced itself transition manager of a transition towards a clean, affordable and secure Dutch energy system. New Gas was one of the original four themes. According to platform New Gas, the natural gas system plays a key role in the current unsustainable Dutch energy system but it can also a key role in a future sustainable energy system. Platform New Gas presents the gas system as the flexible energy system that is needed as a buffer between fluctuating energy demand and a difficult to regulate supply of renewable energy from sun and wind. By undergoing a transition itself – a 'gas transition'- the gas system itself is to become sustainable. The gas transition is a fundamental change from the current natural gas system, towards green gas, more efficient gas applications, hydrogen or biogas fuelled vehicles, etc.

Platform New Gas followed a visionary strategy. Based upon its initial transition scenario of the transition field, a portfolio of appropriate pathways and experiments were identified. Team New Gas (the predecessor of the platform) published a report in 2002 (Team Nieuw Gas 2002) to present its first ideas on the desired gas transition. This report describes the opportunities and barriers for the gas system to change and which key innovations may play a large role in the future gas system. These key innovations on the short term and long term were the use of new gases (biogas, but especially hydrogen) and small-scale combined heat and power production, called micro-CHP, but also other options were explored like driving on natural gas, biomass gasification and carbon capture and storage (CCS).

[20] In % of final energy use (source: Eurostat/ www.energy.eu)

The 2008 mission of the platform was that "*the Netherlands wants to be the cleanest and most innovative gas country in Europe. (...). Platform New Gas supports and guides the way for promising, innovative directions [by developing] a setting that creates the necessary level of commitment and trust for actors in the Dutch gas market in the transition towards a sustainable future*" (Platform Nieuw Gas 2008a). The platform had several working groups, each working on a different transition pathway. The platform was directly responsible for three working groups: Decentralized Gas Applications (primarily focusing on micro-CHP), Hydrogen and Green Gas. Three other transition working groups were by platform New Gas in cooperation with other platforms: Clean Fossils (later integrated in the expert network on CCS), Decentralized Energy Infrastructures (together with platform Sustainable Electricity) and Driving on Natural Gas and Biofuels (for which platform sustainable mobility took the lead and which was sometimes described as part of the pathway 'driving on hydrogen'). Within the ETA, the platform worked together with the working groups, other platforms, the interdepartmental platform energy transition (IPE), which formed the direct interface between the ETA and national policy and the taskforce energy transition. According to internal reports, the platform ambitions for 2008 were to establish the platform as a central player in the gas field through communication, enlarging its active network (specially by including more businesses), addressing barriers identified in the working groups, creating political support for pathways and experiments and strengthening the connection between different platforms.

When comparing the platform and its transition scenarios between 2002 and 2008 several things stand out. First, the tone of the ambition. The 2002 transition scenario was primarily defensive in tone, warning for fragmentation of the gas sector as a result of liberalisation of the gas market. By 2008 the overarching transition scenario became more confident and cohesive. The transition scenarios, both at the level of the gas system as a whole and for the various transition pathways, became more explicit and detailed. These pathways were published in a range of reports (Gas 2007; Gas 2008; Platform Nieuw Gas 2008a; Platform Nieuw Gas 2008b). The platform has opened up to accommodate new working groups in reaction to developments in the transition field. The general focus of the platform remained the same, including the transition pathways and the importance of the gas system and its players in a sustainable energy system. On a smaller scale, some changes become apparent like a shift in focus from hydrogen to biogas and synthetic natural gas. In terms of platform composition, the majority of the original platform members continued to stay in the platform and the platform was strongly dominated by members working for incumbent gas companies and –to a lesser extent- knowledge institutes (see table 8.1).

Table 8.1: Platform composition in 2002 and 2008, (GC are people working for (large) gas companies, NGO are Non-governmental organizations, I are intermediaries, Gov is government and KI means working for Knowledge Institutes)

2002 Members

1. Ulco Vermeulen, chairman, Gasunie (GC)
2. Jeroen de Swart, Eneco Energie, (GC)
3. Catrinus Jepma, Groningen University (KI)
4. Peter Aubert* Department of Economic Affairs (Gov)
5. Daan Vlugt, Obragas (GC)
6. Jelte Bosma, Shell (GC)
7. Bert Stuij, AgentschapNL (I)
8. Chris Glerum, Gasunie, (GC)
9. Harry Schreurs, AgentschapNL (GC)
10. Johan Wempe, KPMG, EUR (KI)
11. Jan Slump KPMG, project secretary (I)

Members 2008

1. Ulco Vermeulen, chairman, Gasunie (GC)
2. Jeroen de Swart, Eneco Energie, (GC)
3. Catrinus Jepma, Groningen University (KI)
4. Marianne Zuur, Department of Economic Affairs (Gov)
5. Bert Stuij, AgentschapNL (I)
6. Chris Glerum, Gasunie, (GC)
7. Harry Schreurs, AgentschapNL (GC)
8. Johan Wempe, Hanze Hogeschool (KI)
9. Frank de Bruin ECN (KI)
10. Erik van Engelen, Essent (GC)
11. Menno Groeneveld, Gasunie (GC)
12. Frans Rooijers, CE (I/KI)
13. Hans Jager, Stichting Natuur en Milieu (NGO)
14. Hans Overdiep, GasTerra (GC)
15. Jörg Gigler GasTerra (GC)
16. Annelies Jonkman, project secretary, AgentschapNL (I)

8.3 MONITORING DESIGN

This section presents the monitoring design with regard to the focus and theory-of-change used and how these were translated to indicators. Heuristics were developed to guide the analysis and recommendations and the main information sources of the monitoring are described.

FOCUS

In May 2008 the platform secretary was contacted to discuss the monitoring application. It became clear that the platform chairman saw a role for transition monitoring in describing transition (management) processes rather than monitoring specific projects and business plans (interview with Ulco Vermeulen, 2008). This resulted in a focus on the transition field. More specifically the transition scenarios surrounding the gas sector, sustainability issues and transition dynamics in the gas system. The dynamics in the transition field were compared to the activities and transition scenario in the platform (= programme). The platform had little capacity to participate heavily in the monitoring process as they had just completed evaluating the innovation systems around core technologies in various pathways (see also chapter 10). The monitoring team consisted of a transition researcher (me, in this case), the platform secretary (and her interim) and a monitoring expert from AgentschapNL (the agency responsible for implementing Dutch innovation policies, especially with regard to energy). Monitoring took place in a period when the platform was finalizing an update of their earlier transition scenario. In terms of programme phase, this corresponds to the start of a second cycle of programming. The purpose was to stimulate reflection in the platform about its current scenarios, activities and composition.

THEORY-OF-CHANGE

One cannot meaningfully speak about (and monitor) *the* gas transition without defining which transition is at stake. Because in any system and at any time, different transition processes may be identified (see for example Gerrits 2008).

The most dominant scenarios as formulated by actors within the transition field in 2008 were taken as a starting point. Each scenario describes a potential transition in the current gas system and the dynamics, and sustainability implications of these transitions are described separately.

The platform addresses the entire gas system, and a theoretical perspective was used that was developed for this level of aggregation. The monitoring is based on de Haan's theory on transition dynamics (De Haan 2010; De Haan and Rotmans2011). This theory identifies qualitatively different transition patterns with different transition management implications. The theory explains transition dynamics based on conditions, patterns and pathways that are implied by the multi-level model as developed by Rip, Kemp and Geels (1998; 2000). This multi-level model (not to be confused with the multi-level monitoring model) distinguishes three levels in the transition field. The meso-level describes regimes or dominant constellations that work (Rip and Kemp 1998). In this case, the primary regime is the gas regime that organizes the gas chain from extraction to final use. The macro, or landscape level describes the (inter-) national context of this regime and the micro–level the small-scale, innovative niches that present alternatives to the regime.

With regard to the main conditions for regime change or drivers of a transition, De Haan identifies three types of conditions (see figure 8.1): tension between the meso-level regime and the macro-level landscape, stress within the regime and pressure from niches at the micro-level. Tension with the landscape is created by large-scale developments like changing political discourses, the international technical state-of-the art and depletion of resources that result in a misalignment between regime and landscape.

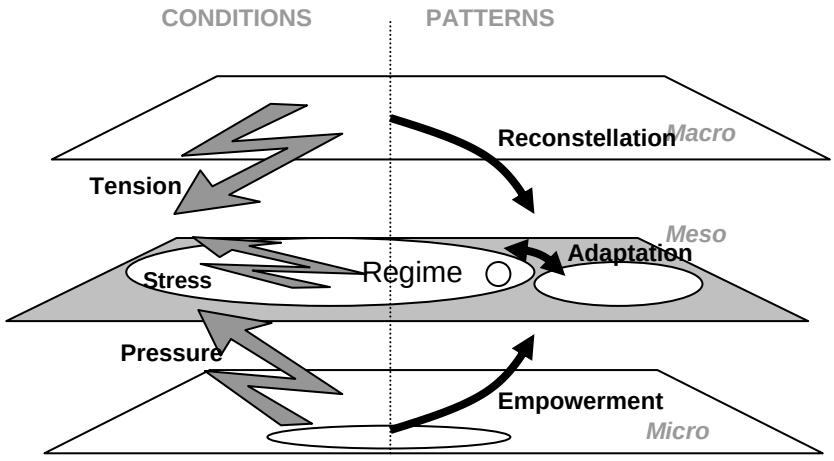

Figure 8.1 different conditions for change and patterns in the multi-level model

Stress is a condition for change within the regime itself. When the ambitions and values of regime-players do not match the current practice and structure of the regime, this is referred to as stress. Stress motivates actors in the gas regime to incorporate innovations and initiate regime-change to solve experienced problems or to seize opportunities. Niches put pressure on the regime when they grow, locally out-perform the regime and get increasing attention.

Conditions are an essential but not sufficient cause for the emergence of transition patterns. Three types of transition patterns are distinguished with respect to landscape-niche-regime interaction. The patterns are a bottom-up pattern referred to as empowerment, a top-down pattern referred to as reconstellation and the middle-out pattern is regime adaptation. In empowerment, niches scale up independently from the regime and keep their distinguishing actors, culture, structure and practices. Ultimately, increasingly empowered niches become a dominant culture, structure and practice in their own right, in other words, they become a regime. Over time such a new regime replaces the old regime. To better identify and monitor this pattern, three dimensions of empowerment are proposed. Empowerment means that

the routines, culture and structure of a niche becomes more stable, that its key innovations are used more widely (diffuse) and that the niche becomes embedded in a broader institutional context. A reconstellation pattern is instigated by large actors outside the regime (like the national government or the EU), or international shocks onto the regime. An example is the establishment of a European Emission Trading System. In the adaptation pattern, the regime itself adapts and maintains control. Adaptation comes in two forms: adaptation by co-evolution and adaptation by absorbing niches. Co-evolution changes the relation between regimes. In niche absorption the regime incorporates a niche into its functioning, while its overall culture, structure and practices largely remain the same. An example is a major supermarket that starts to sell small quantities of sustainable food products. In the process of adaptation, the distinguishing culture, structure and practices of the niche fade until the niche is fully assimilated. Over the course of a transition different conditions and patterns may play a role. For instance empowered niches may put a larger pressure on the regime, leading to more stress within the regime that can lead to the absorption of these niches.

TRANSITION FIELD INDICATORS

Having outlined the transition theory, it is now time to translate this into indicators for monitoring the transition dynamics in the gas system, staring with a definition of the boundaries. The boundaries of the transition field are defined from the perspective of the platform and more specifically the transition pathways green gas and micro-CHP. This means the transition field consists of all actors, rules and technologies in the chain from natural gas extraction, trade, transport, distribution and supply to end-users like power plants, industries (as energy source and chemical feedstock) and small users (for heating space and tap water and cooking). As implied by the transition pathways green gas and micro-CHP, also the relation between the gas system and the agricultural system, electricity system, automotive fuel system and construction sector are included, although not fully and only from a 'gas perspective'. Each of these sectors can be thought of as a different regime. It should be noted that this focus on the gas system is most relevant for the platform but loses part of the potential to challenge some of the key assumptions of the platform and inadvertently downplays the importance of alternatives to gas, like non-gas futures, sustainable consumption, energy-saving, etc.

The gas system is confronted with the same sustainability issues as the energy system at large. The ETA defines these sustainability issues as the need for a clean, reliable and affordable energy system. The gas system is responsible for a large part of the CO_2 emissions, domestic resources are dwindling, making gas a less reliable energy source and prices may go up. Partially as a result of the tensions between the current gas system and these sustainability issue, the gas system can change in different directions. These directions are described in transition scenarios and each scenario has its own sustainability effects, conditions, patterns and speed.

The dynamics of each transition scenario are monitored on nine aspects related to the monitoring framework. These aspects are monitored qualitatively or with quantitative indicators (see table 8.2).

Table 8.2: transition dynamics are monitored by looking at indicators for nine different aspects concerning the transition scenarios, implied sustainability effect and structural change.

Transition scenario Indicators	***Sustainability Indicators***	***Indicators for changes in culture, structure and practices***
TS.1 Development *(qualitative description*	S.1 Clean *(proposed effect ion air*	C.1 Phase *(predevelopment or acceleration phase,*

	quality and CO2 emissions)	*description current events)*
TS.2 Attention *(#newspaper articles, actors backing the scenario)*	S.2 Affordable *(proposed effect on energy prices*)	C.2 Conditions for change *(description of tension stress and pressure, partially based on sustainability indicators, types of actors supporting the scenario (TS.2) and implied novelty (TS.3))*
TS. 3 Implied novelty *(deviation from current regime on selected issues)*	S. 3 Reliability *(proposed effect (deviation from current regime on selected issues)*	C3. Dominant transition pattern *(bottom-up, top-down, regimeadaptation)*

Starting with the dimension of transition scenario, each transition scenario consists of a description of the elements in the current system that need to be changed, how this is to happen and to what situation it should lead. These transition scenarios change over time. This **development** of transition scenarios is described qualitatively based on reports, studies and newspaper articles. The **attention** for each transition scenario is described quantitatively by the estimated number of articles in national newspapers that refer to a particular scenario[21] and by listing the actors in these articles who back and voice them. A distinction is made by support from regime-players and support from other players. A regime-player is defined as an actor who has played a key role in the gas system for an extended period like the Ministry of economic affairs, major energy companies, natural gas traders and distributors, etc. A third aspect is the **implied novelty** with regard to the current gas system. Seven categories have been used to assess the implied changes (see table 8.3). This set of categories is chosen because they are relevant to make a distinction between different transition scenarios, they are recognizable for stakeholders and cover a broad range of topics[22].

Table 8.3 characteristic cultural and structural elements that may change according to a transition scenario

Topic
a) Functionality of the gas system in the Dutch energy system b) System boundaries (geographical and with other regimes in the Netherlands) c) Governance (relation between state and market) d) Changes in cost structure through internalisation of external, sustainability-related costs. e) Primary energy source (natural gas, coal, biomass) f) Organization of gas production and distribution (central or local, domestic or foreign) g) Technology (for production, transport and final use)

The next dimension is sustainability. For each scenario the sustainability effects are estimated based on criteria how clean, affordable and reliable the anticipated gas system will be compared to the current gas system. These criteria are operationalized as follows. A

[21] Number of hits for scenario-specific keywords in national newspapers in the lexisnexus database over the period 1995-2008, corrected for the total number of articles of that year in the data-base (the number of articles is estimated to be correlated to the number of articles featuring the letter 'a' in the first week of March) and a correction factor (the percentage of hits from a random sample of 100 hits that correctly corresponded to a certain transition scenario).

[22] Of course other categories are possible and especially some of the 'softer' changes in culture, competences and roles are underrepresented. The choice of categories should ideally be made by stakeholders (see also Stirling 1998). Another issue is that the 'end state' of different transition scenarios may be fuzzy or subject to interpretation.

clean gas system is a gas system with lower CO_2 emissions. **Affordability** refers to the energy costs for end users. Affordability increases when gas prices are lower and/or gas is used more efficiently. **Reliability** refers to both the availability of enough energy to meet the demand and the dependency on foreign imports from countries that exercise political power through control of the energy flows.

The first aspect of the current changes in culture, structure and practices is the **transition phase**. When scenarios change over time, so may the relevant indicators. It remains difficult to pinpoint the exact take-off point and the transition phase is therefore roughly described as before take-off – or in predevelopment – or after take-off –in acceleration- (Rotmans et al. 2001). The second aspect of structural change is the development of the **conditions for change**. These conditions are formed by all three dimensions of the TMon approach. They depend on transition scenarios and sustainability indicators, together with additional landscape trends for specific transition scenarios (see table 8.4). The indicators for each type of condition are as follows. Stress is indicated by transition scenarios that are advocated by regime-players. A niche exerts pressure when it is (1) sizeable, (2) it locally outperforms the regime and (3) it is recognized as an interesting alternative. The operational definition of sizeable depends on the available information sources. The size of niches can be described as a market percentage (eg in 2007 trams/buses and subways accounted for 3% of total travelled kilometres, making it a niche of reasonable size in mobility) or diffusion of key technologies/practices, etc. This measure is not very telling for smaller niches. The growth of these niches may be better indicated by innovation system analyses (Hekkert, Suurs et al. 2007 see also chapter 9). Innovation systems analysis for almost all key technologies within the ETA was conducted in spring 2008. These analyses showed that some innovation systems were stronger than others. The strength of the innovation system is an indicator for the size of a niche. For technologies in small niches where this information was not present and an estimate was made based on the number of innovation projects and the total investments. A niche locally outperforms the regime when it is at least in some practical contexts more clean, reliable or affordable. A niche is well-known when it features in more national newspaper articles. The final aspect is the dominant **transition pattern**: empowerment, reconstellation and adaptation (either through co-evolution or niche-empowerment). An estimate was made on the currently dominant pattern based on the description in the previous subsection. Empowerment is indicated by growing niches, with a more stable culture, structure and practices and actor network, which remain quite distinct from the current gas regime. Reconstellation is indicated by large-scale interventions of macro-level actors. Adaptation through absorption of niches is indicated by activities to align the niche more to the gas regime culture, structure, practices and actor network. In the case of adaptation through co-evolution, other regimes also play a role and niches are used to align the culture, structure and practices between different regimes.

Table 8.4: Conditions for change expressed in the monitoring dimensions sustainability, transition scenarios and changes in culture, structure and practices

Type of condition	***… associated with sustainability***	***… associated with transition scenarios***	***…. Associated with structural change***
Tension from macro-level	Poor performance of the regime on sustainability issues	Transition scenarios supported by the general public and macro-level actors	Other landscape developments
Stress within meso-level	Heavy emphasis on the	Transition scenarios	-

	unsustainability of the current gas system by regime-actors	supported by regime players	
Pressure from micro-level	Niches outperform the regime on sustainability issues	Niches feature in transition scenarios that draw wide attention	Size

STEERING HEURISTICS

The steering heuristics of chapter 5 describe good programme management as management that (1) aligns the levels in such a way that individual projects activities form a coherent and diverse portfolio that is relevant to –and influences- the transition field and (2) realizes changes in practices, culture and structure in the direction of a transition scenario that is sustainable. Based on TM thinking, these two heuristics have been specified in four more specific heuristics. These heuristics were used to interpret monitoring observations and formulate reflective questions to the platform.

1. *The platform strategically aligns its transition scenarios with those in the transition field to be relevant to and influence the transition field.*

The platform strategically chooses to oppose, support or integrate current scenarios in the transition field by adjusting and communicating its own scenarios. This ambition was also explicit in the platform's mission to "*support and guide the way for promising, innovative directions [by developing] a setting that creates the necessary level of commitment and trust for actors in the Dutch gas market in the transition towards a sustainable future".*

2. *The platform actors and activities are in line with the current transition pattern.*

Every transition pattern is associated with a different rationale, set of conditions, pitfalls and types of actors to be included (Raven 2007). These are presented in table 8.5. Each pattern has its own dominant change agents and is associated with different conditions. In addition, each pattern has different opportunities and pitfalls. The platform can choose to align its activities to a particular pattern by stressing different conditions for change and involving the type of actors you would associate with a certain pattern. It needs to be aware of the opportunities and pitfalls that come with different patterns. By aligning itself to the dominant pattern in the transition field, the platform enhances the current dynamics. If the platform wants to take advantage of the opportunities of a different pattern, it may consciously introduce other change agents in the transition process or try to put other conditions of change on the public agenda thus affecting the dominant transition pattern.

Table 8.5: Strategic implications of different transition patters, largely based on Raven (2007)

	Reconstellation	***Empowerment***
Main actors	Government, major international business, large-scale societal unrest	Niche players and/or players not formerly connected to the regime
Conditions for change	Tension, Stress	Pressure
Opportunities	Offers potential to substantially and irrevocably change the rules of the game, exercise of 'public will'	Offers potential for learning, flexibility, diversity, exercise of entrepreneurial creativity
Pitfalls	Risks of backlash or system breakdown Difficult to gain enough leverage for fundamental change in the political process.	Dividing resources (financial, knowledge, etc.) into a diversity of options can result in insufficient momentum. Remaining stuck in small niches
	Adaptation- absorption	**Adaptation, co-evolution**
Main actors	Regime players and selected niche players	Players from different regimes and possibly selected niches that are necessary to connect different regimes
Conditions for change	Tension, Stress, Pressure	Stress in multiple regimes, Tension, Pressure (if niches are involved)
Opportunities	Easy integration in existing regime and using the power of the regime to realize change	Easy integration in existing regime and using the power of the regime to realize change
Pitfalls	Danger of lock-in into existing regime without radical transformation More difficult with radical innovations. Regime optimisation enhances resistance to change and hardens competition for other alternatives	Danger of lock-in into existing regime without radical transformation More difficult with radical innovations. Regime optimisations and intensified relations to other regimes enhance resistance to change and hardens competition for other alternatives

The platform operates as a broker between working groups, other networks of change agents and the higher level forums.

The platform links the working groups to other platforms and higher level groups like the energy transition board, Ministries and the interdepartmental working group energy transition. From a bottom-up perspective the platform addresses barriers that transcend the influence of the working groups and/or put these on the agenda of the energy transition board and other platforms and change agents. From a top-down perspective the platform can influence individual working groups to align it better to the needs of the platform, other platforms or working groups, the energy transition board, Ministries and/or the interdepartmental working group energy transition.

3. *The platform develops a portfolio of transition pathways and working groups in line with its transition scenario. This portfolio is cohesive and matches the scope of the platform.*

The pathways match the scope of the programme when the vision of the platform fully encompasses the individual transition pathways and the pathways cover the entire vision of the platform. To enhance the cohesion of the portfolio of pathways, the platform manages overlapping issues and interaction between pathways so that they support each other and build up to a larger transition process.

INFORMATION SOURCES

Data on the transition dynamics in the gas system was collected from existing sources. These included (1) internal and public platform documents, (2) Lexisnexus newspaper database for recent information on relevant events and projects and to assess transition scenarios in the transition field, (3) existing reports and studies on the Dutch gas system, scientific and non-scientific, (4) feedback from the platform, AgentschapNL and two interviews with external experts on the Dutch gas and energy system, (5) energy databases like CBS statline, IEA, Interstat and energie.nl and (internal) platform documents.

8.4 IMPLEMENTATION AND RESULTS

This section describes the 2008 transition dynamics in the gas system. This section consists of four subsections. First the different transition scenarios and sustainability trends are described. The second subsection describes in some detail the currently dominant scenario and dynamics on what is referred to as the gas hub. The description is based on the nine aspects of transition items in the monitoring design presented in table 8.2. The developments in 2008 provide a snapshot and are described in the present tense. As dynamics were large, the current situation may be quite different. The other four transition scenario, are described shorty in the third subsection[23]. The final subsection summarizes the different transition dynamics.

SUSTAINABILITY AND TRANSITIONS SCENARIOS OF THE DUTCH GAS SYSTEM

Sustainability issues of the current gas regime as a whole, create an increasing tension between the current gas regime and its landscape, especially concerning reliability and affordability. Dutch CO_2-emissions reached 172Mton in 2007 (S.1). Natural gas is the most carbon-lean fossil fuel, but supplied 42% of the Dutch primary energy consumption in 2007 (down from 50% in 1997). It can be considered both as a large source of carbon emissions and -when more carbon intensive fuels are substituted for NG- as a less environmentally unfriendly fossil fuel[24]. Dutch carbon emissions in 2008 have dropped 4% since 1990, in part because of increasing electricity imports and relatively warm winters. The Kyoto targets are set at 6% reduction and the main environmental advisory board indicates that it is uncertain whether these targets will be met. From 2000, gas prices have risen sharply (S.2 Affordability), because of increasing oil prices and a growing global demand[25]. Between 2000 and 2005 natural gas prices rose 30% compared to coal. The average household spent 4,5% of its budget on heating and lighting in 2000 (natural gas is by far the most used energy carrier for heating). In 2006 this rose to 5,7% of household expenditures[26]. An especially pressing concern is the reliability of gas supply (S.3). While admittedly forecasts on the depletion of the gas reserves have frequently been too pessimistic, 2008 government extrapolations show that that the Netherlands will become a net-importer of natural gas in 2025 (EZ 2008). On a European level, the EU is dependent on imported gas for half its natural gas consumption. This figure is expected

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[23] For a more detailed description of the other three transition scenarios and the activities of the platform is referred to Taanman, M. (2009). Transitiemonitoring Gas. Rotterdam, Drift..

[24] Data by CBS statline

[25] data provided by the IEA

[26] CBS, Statline average expenditures of all household, rental value new definition

to rise to 80% in 2030[27]. These sustainability concerns have led actors to propose different changes to the gas system, leading to different transition scenarios.

People will notice a transition, develop ideas on their origin and direction and have an interest in making them public. Mass media like newspapers provide an up-to-date, quick and relatively easy to access data source to identify transition scenarios. From a sample of 100 articles in national newspapers in the period September 2006 - June 2008, the stated (problematic) present situation, desired future situation and proposed solution were listed and subsequently coded under ten themes[28]. As a second step, the ten themes were grouped into a minimal number of scenarios that covered as many statements and were as mutually exclusive as possible. These scenarios were discussed in the monitoring team and checked with two external experts on the Dutch gas system[29]. The resulting five transition scenarios describe an anticipated change:

1. from a public gas system, through liberalisation towards a Dutch gas hub in a global natural gas market.
2. from fields that produce natural gas to Carbon Capture and Sequestration (CCS) in gas fields
3. from driving on oil-derived fuels to driving on gaseous fuels
4. from natural gas to green gas
5. from the high-efficiency boiler to micro-CHP

As noted earlier, the development of the scenario, the sustainability implications and the changes in culture, structure and practices were described for each scenario separately. The dynamics of the first transition scenario will be described in some detail below.

FROM A PUBLIC GAS SYSTEM, THROUGH LIBERALISATION TOWARDS A DUTCH GAS HUB IN A GLOBAL NATURAL GAS MARKET.

This scenario draws the most attention and concerns large-scale on-going structural change in the gas system. This transition scenario combines the liberalisation-ideal concerning the gas market with the more recent image of the gas hub. In 2008, these two ideas are intertwined and it is frequently difficult to tell whether an event best fits one scenario or the other. A more accurate description would be that the two ideas concern a single, continuous process of structural change during which the initial transition scenario has changed. In the 1990s the dominant perspective was clear: a global liberalised energy market would lead to optimal investments and low prices. The Dutch monopoly of Gasunie was broken. After several years this scenario starts to change (TS.1 development of the scenario, Van de Linde, Correlje et al., 2006).).

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[27] *EZ, Energierapport, 2008*

[28] *Data drawn from three national newspapers that gave the most hits (Telegraaf, Trouw and NRC), from the lexisnexus database with keywords: (or) natural gas, heat, "central heating", biogas, boiler from 1/08/06 to 01/06/08, 1748 hits. Every fifth hit was selected. All articles that did not describe a unique problem, solution and vision regarding an event or development relevant to the Dutch or only concerned incremental change were removed from the data set.*

[29] *Dr. Aad Correlje and prof. Geert Verbong*

Contrary to expectations, many gas producing countries did not liberalise their markets, but started to use gas as a strategic resource to exert political power. Also other governments were not prepared to let go of their utilities. Partly as a result of this development, the reliability of the gas supply increasingly became a political issue in the Netherlands and other countries. Other reasons why gas is kept on the political agenda are state revenues, climate change, uncertainties on the oil market and lacking investment. Internationally a paradigm-shift occurred in the first decade of the new century from free market ideology to minimizing transaction costs and risks (Van de Linde, Correlje et al., 2006). Instead of becoming more of a spot market, gas production, transport etc. are organized in large, long-term contracts. Natural gas has become a global supply-driven market and the increasing use of liquid natural gas (LNG) is a catalyst for this process. This is a market in which the relatively small Dutch market has little power and increasing government intervention is called for and delivered. On the other hand, the EU, large gas consumers and the gas spot market (APX) try to stimulate more market mechanisms. In a newspaper article in 2003, Gasunie introduces a new idea on the role of the Dutch gas system in this global market: the gas hub. According to this idea, the geographical location, harbours, extensive gas infrastructure and the use of empty gas fields as storage or seasonal buffer capacity makes the Netherlands a perfect location to become the main Gas hub in North-Western Europe. This new role requires new pipelines and LNG terminals. This scenario is advocated since then by nearly all large, existing businesses and the national government who together spend billions on realizing it (TS.2). The gas hub and its associated changes like LNG, gas storage in empty fields and new pipelines, is increasingly present in national newspapers (see figure), whereas the number of articles on liberalization decreases in number[30] (see figure 8.2).

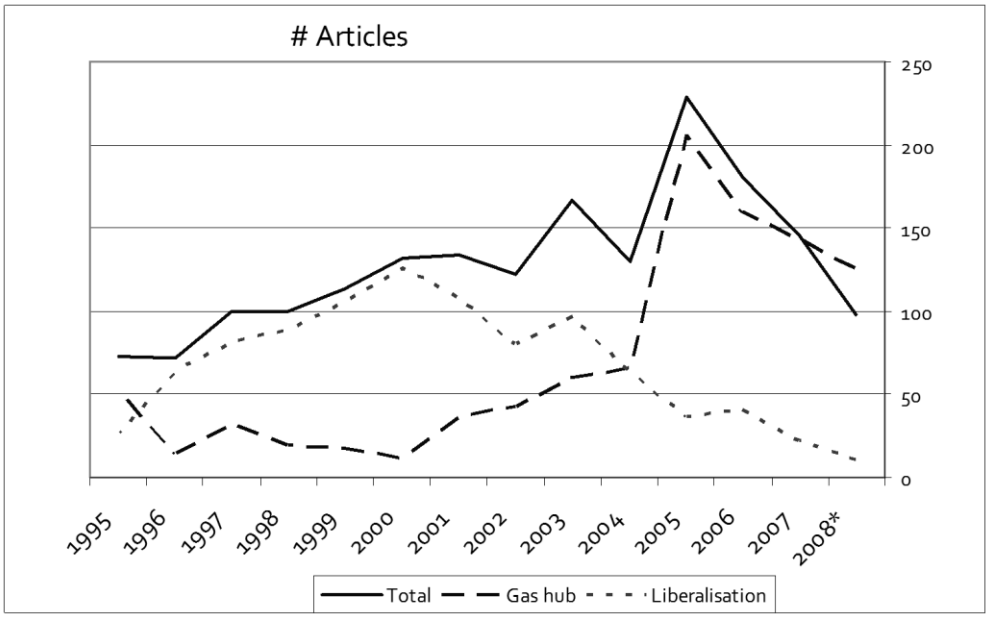

Figure 8.2: newspaper articles referring to the gas hub/LNG and/or liberalisation of the gas system. 2008 figure extrapolated from October to December

Many changes already took place, but realizing the scenario will still mean substantial changes in the current gas system (TS.3). These include new infrastructures and increasing use of gas fields for storage purposes, the return of the

[30] LexisNexus database, all national newspapers with the exception of Metro, Spits, Pers and Dag, keywords (((aardgas OR gasmarkt) AND liberalisering) OR gasrotonde OR lng): 1509 hits, corrected for the number of articles that did not indeed refer to the gas hub/liberalization based on a random sample of 100 articles

government as a major player, increasing internationalisation with Dutch companies working abroad and foreign businesses working in the Netherlands and a shift from domestic to international gas supply.

With respect to sustainability, natural gas is the cleanest fossil fuel. But CO_2 emissions will not change much as the result of this transition which is not primarily about the environment (S.1). Affordability (S.2) is expected to benefit from more market dynamics, however the gas prices are currently rising and risks of underinvestment in infrastructure are present in 2008. The most important benefit is improving the reliability of energy supply (S.3). By positioning the Netherlands as a gas hub, supply is easier to guarantee when domestic gas reserves dwindle and can be obtained from more countries.

Newspaper clippings from Jan-Oct 2008 reveal a high level of dynamism. An international network of gas producers is starting to form, led by Gazprom. Dutch businesses play a role in the global LNG developments. Shell is the global market leader in LNG, and other (partly) Dutch companies build LNG infrastructure around the world. Gasunie takes over management of the North-German gas distribution and transport infrastructure. Ministers of Economic and Foreign Affairs strengthen the ties with gas producing countries. Nationally, energy companies take steps to improve their position on the gas market by building storage capacity in depleted gas fields, buying minority interests in oil and gas fields and participating in LNG projects and plans for joint gas purchasing. There are plans to build four very large LNG terminals, strongly supported by the local municipalities. VOPAK and Gasunie open the first facility in Rotterdam in June. A month later this capacity is already sold and plans for enlarging the facility are presented in spite of construction costs that have risen because of the global boom in LNG[31]. Even though these niches currently fulfil a small part of the functioning, billions of euros are invested. Two tracers are the declining market share of former monopolist Gasunie and the NG imports (C.1). The market share of Gasunie/Gasterra declined from 90% in '98 to 60% in '06, NG imports rose from 3,7 billion Nm^3 in 1995 to 24,3 billion in 2007[32]. Seeing the speed and depth of change, this transition is in an acceleration phase.

This transition is driven by different conditions for change. Globally the market for LNG grows with an average of 7,4%/year from 1997-2007 (C.2, tension)[33]. Other important macro trends are the development of the Gas demand in NW-Europe and the growing Dutch concerns about security of gas supply. This concern increases as a result of the development of GasPEC, lagging investments (shortage of supply) and growing NG demands in non-European markets. The tension between the (inter-) national gas development and the current regime is therefore large and growing. Incumbents in the current regime feel there is a reason to change (C.2, stress), both to adapt to the dwindling reserves and to pursue new opportunities in the global gas market. Gasunie and the government see the gas hub as an important opportunity and give it a central role in their strategy. This urge for change within the regime is large and stable or growing. Niches that are relevant to this scenario are gas storage in empty fields and LNG. These niches receive much attention and resources and appear to outperform the current system in terms of reliability of supply and are apparently

[31] *Newspaper clippings*

[32] *sources, www.energie.nl/ Gasterra and statline*

[33] *source: cedigaz*

profitability for some actors. The pressure from niches related to this scenario like LNG and gas storage is large and growing (C.2. pressure).

This transition started with reconstellation (liberalisation of the gas market). The current pattern of change is adaptation by absorbing new niches. Realizing the gas hub is carried forward by regime players and fits or extends their core competencies. Several niches are absorbed in the process, without changing many of the regime's dominant ways of thinking, working and organizing or changing the relation with other regimes (C.3).

DYNAMICS REGARDING THE OTHER SCENARIOS

Although the dynamics around the gas hub are clearly the largest dynamics in the gas system, also other scenarios and dynamics are present. The dynamics concerning the four other transition scenarios dominant in newspaper clippings are described below.

FROM FIELDS THAT PRODUCE NATURAL GAS TO CCS IN GAS FIELDS

While rising energy prices, debates about climate change and dependency on oil- and gas-producing countries is growing, many feel that energy saving, solar energy, etc. are not up to the challenge in the short-term. Carbon capture and Storage (CCS) is seen more and more as a feasible medium-term solution. Depleted reservoirs may be fit for carbon storage, planned coal power plants produce large amounts of CO_2 and large energy companies like Gasunie and Shell have ample relevant resources, competences and therefore interests in CCS. New elements are attached to transition scenarios about CCS in the years prior to 2008, like the role of multi-fuel power plants that can produce electricity, syngas and/or CO_2. CCS is supported by many regime players like Shell, EnergieNed and the Ministry of Economic Affairs, but also other actors like WWF, the EU and the State support CCS and CCS increasingly draws attention. The gas regime does not have to change fundamentally, but still an extra infrastructure is needed and CCS forms an additional function for the gas system ('gaseous waste' removal and trade). This market may in time become more important than domestic natural gas supply and transport.

CCS can reduce carbon emissions, although there are concerns whether carbon storage is permanent. CCS is strongly linked to coal-fired power plants. The strong focus on CCS may be risky when it legitimizes new coal-fired power plants in the short-term, but fails to be realized[34].The affordability depends primarily on coal prices and CO_2 prices. In 2008, coal prices are on the rise from a stable low in the '90s and doubled from '97 to '07 and again from January '07 to June '08. This price hike is due to growing demand in China and India combined with slow increases in production. For example China turned from a net coal exporting country to a net importer. CO_2 prices in the European carbon trading system are too low to make CCS competitive. CCS improves reliability of the energy system by stimulating a larger use of coal whose reserves are relatively large and geographically well-spread. At the same time the price peak in 2008 shows that coal is not as stable as long thought.

There is no CCS in the Netherlands yet, so this potential transition is before its take-off point. The main macro trends are the construction of new coal-fired power plants in the Netherlands, global developments in CCS and the European CO_2-prices. The number of coal plants is likely to increase although some initiatives were delayed or put off. It is difficult to

[34] *Actually carbon capture from coal plants seems to be more expensive than carbon capture from gas-fired power plants or biofuel plants. The main 'contribution' from coal under the ETS may turn out to be that coal is so environmentally unfriendly that it drives up the carbon prices so CCS becomes cost efficient on other places.*

get a clear understanding of global CCS developments and carbon prices. The attention and support for CCS seems to be growing, but demonstration projects encounter financial, technical or social difficulties in 2008. Uncertainties on carbon prices are likely to remain. This makes it difficult to tell whether tension is increasing and will play out positively or negatively. CCS is widely supported in the regime but is not clear how deep the sense of urgency really is. The pressure of the niche is small but growing. The demonstration project in Barendrecht will prove essential to see whether the government is willing to invest in CCS and public support is large enough. CCS is an add-on to the existing energy system that tightens and changes the relationship between the gas and electricity regime. The main transition pattern is adaptation through co-evolution between the gas and electricity system.

GREEN GAS

The third most dominant transition scenario concerns green gas. Green gas is gas from biomass (biogas) which is upgraded and fed into the gas infrastructure. From its conception around 2001, the platform worked on biogas, synthetic gas and hydrogen. The green gas scenario is an overarching scenario on these gases that focuses on distribution through the gas infrastructure and increasingly also on coal gasification with CCS as a source of green gas. The working group Green Gas formulated a transition pathway late 2007 to replace 1-3% of NG with green gas from fermentation processes in the short term and in the long term replace up to 50% of NG by gasification of (imported) biomass or coal. Outside the ETA mass media hardly used the concept 'green gas' until 2006. Most scenarios were (and still are) about biomass or specific energy conversion technologies like dung fermentation or coal gasification. Green gas, gasification, dung fermentation, etc. are small niches and the green gas network is a mixture of niche and regime players from agriculture, energy and waste treatment together with niche-based advocacy groups like the BBO (Biogas Branch Organization). Green gas implies a change of the boundaries of the gas system with new connections to the agricultural system, waste management, electricity system and international biomass chains.

The sustainability implications are far from straightforward and contested. They strongly depend on the different routes to produce green gas, the chosen reference (other biomass applications or natural gas) and system boundaries surrounding life-cycle assessment. As an example, environmentalists oppose fermentation of pig dung -a prime source for green gas-, because they feel it legitimizes large scale bio-industry, which they consider inherently unsustainable. Platform expectations are that costs of green gas will drop when learning effects and economies of scale are realized, but a fundamental change in the current pricing of gas is necessary. Green gas implies a further diversification of the energy system and reduces the dependency on oil- and gas producing countries in the long term.

The niches around green gas are still small and vulnerable, which suggests this transition is early in its predevelopment. An innovation systems analysis of fermentation technology performed in March 2008, considered only the entrepreneurial activities as *not* inhibiting. In the first ten months of 2008, many new entrepreneurial activities were announced but there was a struggle to include green gas in the new subsidy scheme. Especially thanks to strong support from agricultural organizations who consider green gas as a key ingredient in their voluntary sustainability agreements, some subsidies were granted. The dynamics are influenced by macro developments like the international discussion on the desired role of biomass (imports) in a sustainable energy system, competition with alternative ways of using biomass like biofuels and co-firing in coal plants and global R&D and technological know-how on gasification

technology. It is difficult to assess whether the set of macro trends form a stimulating or inhibiting tension in the direction of green gas. Apart from the strong backing in agriculture, the lack of media attention for green gas by the involved gas and electricity regimes indicates little stress. The small, not very well-known and vulnerable niches exert little, but growing pressure.

FROM DRIVING GASOLINE TO DRIVING NG

There is a bundle of interrelated transition scenarios regarding the introduction of sustainable automotive fuels. A large number of options exist and a sequence of different options is needed to make mobility (fuel-wise) sustainable and there is no consensus which options and sequences are best and most likely. Driving NG is one of these transition scenarios and features in mass media since 2003. It is put forward primarily by new players in the gas and the mobility system including specialized niche players, local government and a fuel station builder, with the gas industry in the background. This scenario constitutes a first step towards biogas or hydrogen fuelled mobility and intensifies the relation between the gas system and the mobility system.

Driving NG reduces local air pollution (a factor 100 compared to diesel engines without soot filter, but comparable to state of the art diesel engines) and CO_2 emissions (minus 25% compared to gasoline engines, comparable to state of the art diesel). Replacing NG by (sustainable) hydrogen and biofuels improves this performance. In 2008, driving NG is already considerably cheaper if you drive over 14.000 kms annually. In terms of reliability NG is more readily available than biogas or hydrogen, but in the long term a lock-in on driving NG would replace one dependency (oil) for the other.

Halfway 2008 there are approximately 800 CNG (Compressed Natural Gas) vehicles and 10 fuel stations, but municipalities and companies enter the market. Niches include public transport buses and dustcarts. The national government supports driving NG financially for example through fuel tax exemptions. Globally, driving NG is not a new phenomenon. For example Italy, Germany and Canada have (mixed) experiences with driving NG. Major macro-trends are the strong global growth of NG vehicles and fuel stations (13% annually, primarily in Asia[35]), the slowly but continuously rising Dutch and European diesel and gasoline prices and the concerns for local air pollution. These trends indicate that the tension with the current mobility is growing and favourable for NG. NG is competing with electric vehicles and biofuels. These competitive fuel systems are also growing. There does not seem a lot of stress in the regime. Although the government supports driving NG, Shell is heavily investing in facilities to produce diesel from NG. The niche of driving NG outperforms the current regime (cost and emission-wise), but is still small. Because the transition is primarily driven by niche players that take in a new role in the mobility system, the current pattern can be characterized as empowerment.

FROM THE HIGH-EFFICIENCY BOILER TO MICRO-CHP

Micro-CHP (Combined Heat and Power production) is an important part of the working group decentralized NG applications of the platform. Micro-CHP is a boiler that additionally produces electricity and presented as the successor of the high efficiency boiler. Already in 2002 a vision document of the platform claims that "*micro-CHP is at the brink of market introduction and offers environmental benefits on the relatively short term, without requiring fundamental changes*

[35] *According to the International Association for Natural Gas Vehicles www.iangv.org, accessed September 2008*

in the current infrastructure and the built environment." (Team Nieuw Gas 2002). Since that time development has been gradual and continuous, although micro-CHP still has not been introduced to the market.

The transition scenario for micro-CHP is more short-term, incremental and clear than the other scenarios. Micro-CHP is also part of the longer-term transition scenario towards a decentralized sustainable energy system. Micro CHP is supported by the platform, working group, a network of energy companies (slim met gas) and boiler makers (smart power foundation). All in all, representatives from all stakeholders including the installation branch and housing cooperations are involved.

Micro-CHP is a more efficient way of using natural gas and with 4,1 million boilers zero up to 3Mton of CO_2 emissions can be avoided annually (CO_2 emissions in 2008 50 Mtons) depending on the reference. Current micro-CHP systems cost around 6000 Euro (approx. 3-4 times the price of a new boiler) and save a household around 320 euros annually (Platform Nieuw Gas 2008). A payback period of around 5 years is expected in the medium term. Because the boiler is ultimately more efficient than current gas-fired power plants and may form a virtual power plant, it has a positive effect on the reliability of electricity.

The heat demand of households -a larger heat demand makes micro-CHP cheaper- and the ratio between the electricity price and the gas price –a higher ratio makes it more interesting to produce your own electricity- are not developing positively for micro-CHP. Therefore the main market is expected to be older housing in cities. Another influential macro trend is the development of small-scale CHP and smart grids in the Netherlands. The support of regime players for micro-CHP suggests a reasonable stress and although its niche is small and not well-known, the pressure from micro-CHP on the regime is growing. The strong focus on regime players and fit to the present system corresponds to a transition pattern of adaptation through niche-absorption.

SYNTHESIS: TRANSITION DYNAMICS IN THE GAS SYSTEM

The transition analysis of the gas system revealed different dynamics in different directions. Together the transition dynamics surrounding the five transition scenarios described a large part of the changes taking place in the transition field. Unlike renewable electricity production, in which the options were already present for decades, most scenarios in the gas system started to draw attention only five years earlier (see figure 8.3). Looking at the gas system through the scenario of a gas hub revealed the most powerful dynamics.

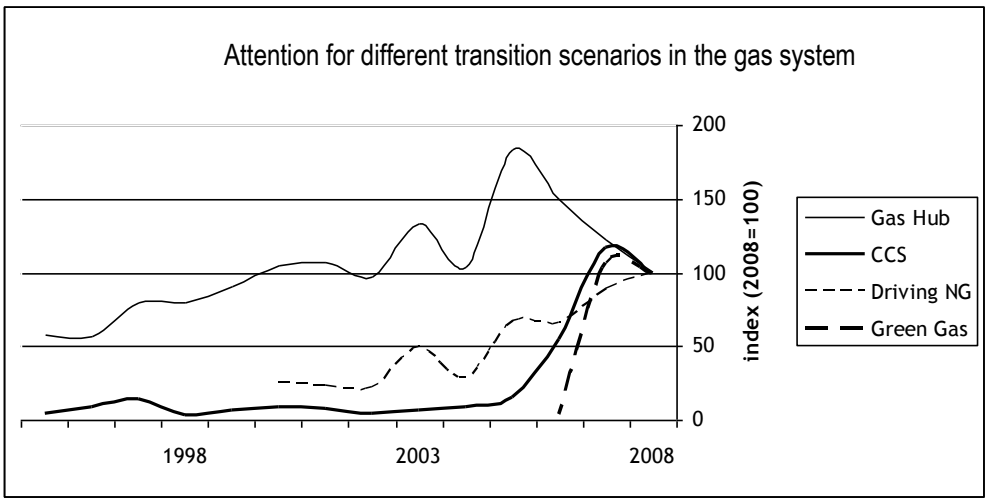

Figure 8.3: Index for attention for different gas transitions in national media (2008=100), the number of articles on micro-chp is too small to show a trend

The scenarios were neither fully sustainable nor unsustainable, but every scenario had its own sustainability advantages. For example the gas hub showed great potential to enhance the reliability of the energy supply, green gas was cleaner and driving NG may result in lower energy costs. This meant that a sustainable gas system requires combining different scenarios and types of dynamics.

Each of the transition scenarios had its own conditions and transition pattern (see table 8.6, next page). Most niches were not large or known enough to exert much pressure nor are they able to outperform the current regime. Interestingly, the five transition scenarios show three different transition patterns. Driving NG had a strong empowerment character. It was developed in small market niches by many players not previously involved in fuel distribution or natural gas like regional governments and developed its own discourse, institutional structure and practices. Micro-CHP and the gas hub were aligned to (different parts of) the current transition field and followed an adaptation-absorption pathway. CCS formed a new connection between the electricity and the gas system and influenced the development of both systems and should thus be considered adaptation-co-evolution.

Scenario	Phase	Pattern	Tension	Stress	Pressure
Gas Hub	Acceleration. It is a continuation of the liberalisation scenario that already resulted in many changes.	Adaptation, absorption. The Gas Hub largely matches the current competences, structure, technology, boundaries etc. of the gas regime.	High and growing as a result of the growing global LNG market and long-term trend of increasing Dutch gas imports and exports	High and stable as most gas incumbents acknowledge and advocate the importance of this scenario	High and growing as particular innovations and projects like seasonal gas storage, LNG terminals and storage draw attention and resources and improve the reliability of the gas system .
Carbon Sink	Predevelopment. No CCS is taking place in 2008.	Adaptation, co-evolution. CCS does not require fundamental changes in gas or electricity regimes but does affect their relation	Ambiguous. The return of coal is a global phenomenon and national and EU government support CCS, but CCS is new and uncertainties regarding future carbon prices (or political will to enforce CCS) prevail	Moderate and growing as more and more electricity and gas incumbents see this as a desirable scenario	Small but growing. Implementation is not achieved but it draws more attention and resources, and there are various concrete plans
Green gas	Predevelopment. Little diffusion and poor functioning of most innovation functions	Too early to tell. Both niche and regime players (eg farmer's associations) play a role and some aspects match current regimes while others don't.	Ambiguous, controversy about the desirability of large-scale biomass use and competition between uses. Fermentation is mainstream, gasification not.	Small and stable. Government and Gasunie support the idea, but do not invest big. Farmer's associations are strong supporters	Small, as the niche remains small and unstable
Driving NG	Predevelopment. The number of NG-vehicles (NGVs) has grown to some 800 and filling stations to 10	Empowerment. Driving NG is a niche with new or deviant players, new regulation, forums for coordination, etc.	High and growing as the European market for NGVs grows 13% annually, local air quality issues gain prominence and gasoline prices rise.	Incumbent fuel stations, car manufacturers etc. show little signs of enthusiasm or threat	Only a small niche, but it is growing and its sustainability advantages materialize
Micro-CHP	Predevelopment. Some 100 installed, but stable and strong support	Adaptation – absorption. Largely fits current activities and competences of boiler makers and installation branche.	Little and declining as space heating demand declines and gas/electricity ratios deteriorate	Reasonable regime support through boiler makers, some energy companies etc.	Small, but growing as the business case for micro-CHP improves and wide spread-diffusion is anticipated.

8.5 REFLECTION ON THE RESULTS BY THE PLATFORM

The monitoring results were presented to the platform in December 2008. Because there was little interaction with other platform members than the platform secretary during the monitoring process, the recommendations were presented as questions by the transition exert to engage in a discussion rather than as worked-out recommendations. To make them more salient, the findings on the level of the transition field were compared to some of the platform documents. Each question was based on a different part of the monitoring results. These questions were discussed for an hour. The four

steering heuristics in section 8.3 correspond with the four questions asked[36]. In this section, each question will be explained and followed by the discussion that took place.

QUESTION 1: CAN THE DYNAMICS OF THE GAS HUB BE USED MORE EXPLICITLY TO FURTHER THE PLATFORM AMBITIONS?

The first question was based on the heuristic that the platform should make use of other scenarios and in the transition field.The gas hub was the dominant scenario in the transition field but also the only transition scenario for which the platform did not have a working group and which was not explicitly addressed in the platform vision. Macro-trends were favourable and there were many transitional changes. The gas hub had limited potential for reducing carbon emissions, but improved the reliability of energy supply. It could positively or negatively affect the transition pathways like Green Gas and Clean Fossils that were needed to make the gas system cleaner. When the gas hub leads to stringent gas criteria and the full capacity of the higher networks is sold in long-term contracts, this may impede both local and large-scale feed-in of green gas in these networks. The increasing use of gas fields as a buffer for seasonal variations in gas demand may conflict with attractive capacity for permanent sequestration of CO_2. On the positive side, the gas hub may be used for international biogas transportation, which reduces the long-range transportation of biomass (and its nutrients). A future CO_2 infrastructure may profit from the current dynamics in the Netherlands, resulting in a CO_2 hub as proposed in the Rotterdam area and Energy Valley in the North of the country. The platform can stimulate its transition scenarios by connecting them to the gas hub and stimulate that the transitional developments reinforce rather than obstruct each other.

The discussion on the first question centred on the image of the platform and its main audiences. Various members were surprised that the reports of the platform did not explicitly link the gas hub to the other four transition pathways, but recognized the advantages of doing so more explicitly. One idea was to link them explicitly to the hub-idea, by promoting the Netherlands as a CO_2 hub, green gas hub, etc. Platform members discussed that a CO_2-hub may have too many negative connotations (the Netherlands as a processor of harmful emissions), whereas a green gas hub had more positive, sustainability connotations. The discussion did not extend to the question under which conditions a gas hub might favours or threaten green gas. The capacity of the infrastructure was not considered a bottleneck to accommodate both natural gas and green gas.

QUESTION 2: ARE MICRO CHP, GREEN GAS AND DRIVING ON NATURAL GAS BEST STIMULATED WITH OR WITHOUT THE REGIME?

This question referred to the heuristic that the platform actors and activities should be attuned to the current transition pattern.

The monitoring provided three examples. First, driving on NG resembles an empowerment pattern, but the platform seemed to focus primarily on regime actors. Second, Green Gas did not follow a particular transition pattern, which means the platform could still choose. Third, micro-CHP followed a regime adaptation pattern. The platform activities did match this pattern, but it could be worthwhile to reflect on some of its pitfalls.

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36 The monitoring report lists seven questions, but to maintain focus in the discussion, only four out of these questions were discussed in the presentation.

Regarding the first example, the dynamics around driving NG indicated an empowerment pattern. Many platform members worked for large gas companies and the platform had a strong focus on the national government. A focus on gas companies and the national government is not necessarily the best way to speed up this transition pathway. Should the platform not stimulate that this niche remained independent from the national government, at least until it could develop enough power to compete with the powerful oil lobby at the national level? The second example was green gas. According to platform documents, gas network companies played a crucial role. They seemed to focus on universal (as opposed to situational) rules and risk-aversive behaviour: "*system operators aim for universal rules for all forms of distributed gas feed-in*" (Platform Nieuw Gas en Platform Duurzame elektriciteitsvoorziening 2008) and "*Because of the previously described uncertainties and limited amounts, feed in of green gas in the higher networks is not an option. First they want to eliminate the risks and only then accommodate feed in*" (SenterNovem et al. 2008). Universal rules and risk-aversive behaviour de facto benefit well-known, universally used gases more than innovative green gases and may be regarded as regime-oriented. Developing fail-safe regulation may be a difficult, slow and easily politicized process because of the many different types of green gas and the large number of potential negative effects (from corroding pipes to public health hazards from microbes). An alternative would be a bottom-up, trial-and-error approach with local experiments and solutions. In the end such a strategy could be a quicker way to understand the risks and develop good rules. Last, micro-CHP could be regarded as an innovative (natural) gas application, but could also be viewed as part of a transition towards a sustainable distributed energy system Platform Nieuw Gas en Platform Duurzame elektriciteitsvoorziening 2008). The platform stimulated an adaptation-absorption pattern that resulted in a broad support in the installation sector and boiler makers and dedicated knowledge networks and interest groups outside the ETA. The platform was asked how it could prevent that that this consensus-based strategy would not result in an early lock-in that impedes the additional steps in the transition towards fuels cells, smart-grids, etc.? For boiler-makers the micro-CHP was a logical successor of the high efficiency boiler introduced some thirty years earlier. They had a strong interest in innovation that allowed them to compete with low-cost production abroad. Smart grids, fuel cells etc. however were not part of their core competence. At the same time, in the 2008 installation market new and more innovative companies started to appear. Wouldn't it be a good moment to shift the platform focus to a new selective group of frontrunners to prepare for the next steps towards fuel cells and smart grids that may benefit more from a different transition pattern?

The platform did not take the transition patterns themselves as a starting point of discussion. The question did spark a discussion on the relation between the platform and the regime. A platform member was critical that the economic structure of the current gas system was not addressed explicitly by the monitoring and also not by the platform itself. Discussions in the platform about regulation and finance focused on exemptions and subsidies but not the core of the current legal and economics of the gas system. Secondly, the focus of the platform on the government was questioned. Should the government be the main actor to be addressed by the platform or are other actors at least as important? Related to these points, it was felt that the current scenario and local experiments were quite good, but that there is a 'gap' between long-term ambitions and short-term projects. Additional measures are needed for scenarios and experiments to lead to a powerful change process and additional thought was necessary which role the platform could play in this. The platform decided that it needed an additional meeting to discuss this.

QUESTION 3: SHOULD THE PLATFORM CONNECT TRANSITION PATHWAYS MORE INTENSIVELY?

Each pathway presented an element of a sustainable gas system. The pathways of New Gas concerned either innovative gas supply or innovative use. Both had shown their feasibility in transition experiments[37]. Now individual elements had been tried and have succeeded, it could be time to scale up the lessons and connect the separate pathways. Integrating pathways might have larger sustainability effects, may attract premium markets, attract new attention and support from media, public and politics and offer new opportunities for learning and innovation. It seemed for example wasteful to use green gas for low-quality purposes like heating tap water. Likewise, micro-CHP with green gas would be more sustainable than micro-CHP with natural gas. The experiments with biogas fuelled public transport buses in 2008 were presented as an example how pathways could be connected.

The platform acknowledged that it is useful to create more synergies between the pathways and connect innovative, valuable gas production and use. Especially in mobility, biogas-fueled vehicles are an interesting option both as a way of greening mobility and as a step towards hydrogen fuelled vehicles. At the same time, the bottleneck is the lack of green gas production and platform members not sure whether this should be resolved by stimulating demand (eg stimulating green micro CHP or biogas fuelled vehicles) or by stimulating supply.

QUESTION 4 WILL THE ETA STRUCTURE WITH ITS PLATFORMS AND TRANSITION PATHWAYS SUFFICE IN THE MEDIUM TERM?

This question refers to the idea that a different framing of the problem (in this case how to create a sustainable energy system in the Netherlands) should lead to a different type of intervention and governance structure, making this question the most reflexive of the four. The platforms were based on the traditional sector-definitions that are an intrinsic part of the present energy regime. Over time these platforms were institutionalized. As their transition scenarios and pathways developed, it became increasingly clear that the sector-oriented platforms did not match the generally cross-sector pathways and new pathways generally needed different platforms to voice their interests and concerns. For example several barriers for Green Gas required interventions from the agricultural department, through platform biomass, while the platform New Gas mainly addressed the gas issues and had ties to Economic Affairs. Although these cross-platform linkages prevent a (sectoral) tunnel vision, they also make the ETA structure more complex and opaque as they increase the coordination needs within the ETA. A proposed solution would be to redefine the platforms, to better match the pathways in such a way that they reflect the structure of a new, sustainable energy system, instead of the existing one.

The question on the structure of the ETA was felt least important question according to the chairman. Changing the present structure of the ETA would have many disadvantages like breaking up networks that have taken several years to form, making the ETA less recognizable for sectoral players, etc. The present structure was considered flexible enough to accommodate new developments and innovations by setting up new working groups or coordinated efforts of different platforms. Other platform members raised critical questions whether the platform really was able to identify new opportunities quickly enough and if the ETA is transparent enough. In the end of the discussion the platform members seemed to agree that they had found a fair balance between the transparency and focus of a structured organization and the flexibility and creativity of a loosely structured network.

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[37] with the exception of CCS for which no Dutch experiments have been realized to date

EPILOGUE

Based on this discussion, the platform decided to plan a strategy day in February 2009 as an input for the communication plan for 2009. In preparation, platform members wrote a reflection on the discussion to discuss the role of the platform.

To give feedback on the discussion and as possible input for the reflections of platform members, I was also asked to write a reflection myself on the discussion. In this short memo, I again tried to bring attention to the implications of connecting the pathways to the gas hub and to the argument that different transition patterns imply a different role of the platform. Because the minutes left room for ambiguity about the focus of the strategy day, I restated that the main question for the strategy day that was raised by the platform during the discussion was "*what is needed besides a good scenario and local experiments for a forceful transition process*?", including the role of the platform, its main audience and the necessary institutional, economical and juridical structural changes.

Effects of the transition monitoring occurred to the extent that platform members found the ideas and questions raised valuable and congruent with their own ideas. The three personal reflections written by platform members were closely related to the prior discussion of the TMon results. They further explored ideas about green gas hubs, syngas hubs and CO_2 hubs and implications for the platform activities. A member mentioned the idea of biogas fuelled fuel cell vehicles as a combination of different transition pathways. The individual reflections pointed to different roles of the platform in the energy transition. One member saw the platform ideally as a government advisory body to help find order in the many different options by maintaining a critical, factual, unbiased position, highlighting necessary experiments and studies and not be tempted to turn into a lobby. Another platform member saw a more activist role in which the platform acts as a spokesman for interests in a sustainable gas system, including necessary behavioural change by consumers (a topic that does not receive much attention in the ETA). The latter role can only be played if outsiders do not see the platform as an extension of the natural gas lobby. He therefore advocated including more non-gas actors in the platform. In the strategy day of the platform these issues were discussed and integrated in on-going topics in the platform. Some of the more concrete activities were a round table conference on the gas hub conducted in April 2009. Several months later, the Gas Hub features prominently on the ETA frontpage as one of the main developments supported by the ETA.

8.6 ANALYSIS

This case of transition monitoring is analysed with respect to its lessons regarding transition monitoring in a visionary programme, monitoring in a mode of external reflection and the relation between programme monitoring and transition field monitoring.

THE VISIONARY PROGRAMME STRATEGY

The platform had well-defined transition scenarios, both on the level of the gas system as a whole and at the level of more specific transition pathways on system innovations like green gas and micro CHP. The platform saw an important role for itself in shaping the transition scenarios in the sector at large and setting the agenda. This active and external use of scenarios fits well with the description of visionary programmes in chapter 4. Information about (the dynamics of)

the transition scenarios in the gas system at large was salient because the platform itself was very active in developing and communicating transition scenarios as part of its efforts to stimulate a transition.

The importance that the platform attributed to scenarios about the transition field was reflected in the detail and number of reports the platform wrote on the future of the gas system. The platform was less active in collecting information on individual transition experiments. As a result it was relatively straightforward to monitor the relation between the platform New Gas and the transition field, while it was difficult to monitor the relation between the platform and individual transition experiments. This is in contrast to the transformative programmes TPLZ and TransForum which were described in chapters 6 and 7. These transformative programmes primarily collected information on individual experiments allowing for easy comparison between project and the programme and difficulties to compare the programme to the transition field.

MONITORING AS EXTERNAL REFLECTION

This case is at the limits of what can still be called co-production. Interaction with programme management was limited to a few discussions with the platform secretary and discussing the results with the platform. This lack of co-production and the mode of monitoring (external reflection) meant that the transition expert was responsible for the theoretical angle, indicator design and monitoring. In this case De Haan's theory on transition dynamics was used as a theoretical framework (De Haan 2010; De Haan and Rotmans, 2011) complemented by elements from the transition management model developed by Loorbach (2007). The nine monitored aspects of transition dynamics were relevant for transition processes, clearly follow from the monitoring framework and the theoretical concepts used. The heuristics from the transition monitoring approach in combination with the transition theories used make the relation between monitoring results and reflective questions for management tractable. This enhanced the credibility of the monitoring application. Although more intensive co-production may have resulted in a stronger learning process and ownership by the platform, less intensive co-production seems to have resulted in easier indicator design and a more credible and transparent process.

The monitoring remained close to the role platform members saw for themselves and the goals of the platform. Because the transition scenarios in the gas system matched the scenarios advocated by the platform quite well, the results were generally easily interpreted by the platform members and considered salient. The indicators on conditions and transition patterns formed the exception and did not trigger fundamental discussions for two reasons. First, these conditions and patterns were new concepts to the platform members. They were not only new, A second reason why the transition patterns did not spark intensive discussion may be that the corresponding questions touched upon a sensitive topic: whether the platform should be seen as a representative of the current gas incumbents, or as a more activist platform representing innovative players.

Monitoring in external reflection therefore requires finding a balance between critical distance and staying close to the programme. On the one hand, external reflection should provide a new perspective on the programme to stimulate reflection. This may be done by using a theory-of-change that is different from the programme (in this case the theory on transition dynamics) and/or monitoring different ways of looking at the transition field (in this case starting from the scenarios present in the transition field instead of the platform's scenario). The monitoring should raise questions about the set-up, goals and activities within the programme. On the other hand, too much distance may make it difficult to

interpret the results for programme managers and overtly critical questions by outsiders may lead to a defensive reaction instead of a reflective discussion.

One last issue is that external reflection was necessary, because the platform itself did not have many resources, Where for example the BSIK programmes in which transition monitoring was piloted had a full-time staff, the platform only met once every six weeks. This made it difficult to find the time for larger role of programme management. This situation may present itself in all programmes without fulltime staff.

THE RELATION BETWEEN PROGRAMME AND TRANSITION FIELD MONITORING

This transition monitoring application has two innovative features that are directly related to the monitoring framework's emphasis on different transition scenarios and the role of programmes in the larger transition field. This has guided the analysis and the reflective questions posed to the platform. Firstly, it describes on-going transition dynamics through transition scenarios that are an intrinsic part of these dynamics. Transition scenarios provide the storylines to identify relevant sustainability and transformative change issues and indicators. They not only describe dynamics across time, but also change themselves as the transition unfolds. Monitoring transition dynamics over longer periods therefore requires a regular update of these transition scenarios and a consequent reframing of sustainability and structural change indicators. This helps to avoid 'missing' transitions (Shove and Walker 2007) and acknowledges that complex systems can undergo numerous transitions simultaneously (Gerrits 2008). Secondly, it uses these transition dynamics to reflect on the platform as a change agent by involving (new) people, marketing transition scenarios, identifying and supporting experiments and a lobby for regulatory change. In addition it is one of the first applications of the so-called 'pillar theory' on transition dynamics (Haan 2010; de Haan and Rotmans in press). Partly because of the approach taken, the monitoring did not address fundamental barriers in the gas regime at large, like the overall price structure and regulatory framework that provide the rules to the game for actors in the gas system. This was identified by the platform members who felt that there was a gap between the long-term ambitions of the platform and local experimentation.

The results show a rather strong alignment between the scenarios advocated by the platform and those present in newspaper articles. The focus and composition of the platform is not in line with all transition patterns. The platform seems to be especially well-positioned to facilitate adaptations within the current gas regime as is the case in micro-CHP and the Gas Hub. It seems less well positioned to redefine current sector boundaries or challenge the incumbent gas regime required for CCS, driving gaseous fuels and (possibly) green gas. Platform members are aware of these issues and also self-critical, but feel that the benefits of fundamental changes to the platform do not outweigh the costs. As such there is an upper limit to how flexible the platform wants to be.

8.7 SUMMARY AND CONCLUSIONS

For platform new gas an in depth analysis of the transition dynamics in the gas field was conducted. The platform was then compared to these dynamics to reflect on its composition, transition scenarios and activities. The transition field was described by identifying (the development of) different transition scenarios in the gas system as apparent in newspaper articles. For each of the transition scenario's the current conditions and patterns were described based on the theory of change developed by De Haan (2010). Also the sustainability implications of these transition scenarios were described.

Comparison with the platform resulted in four reflective questions discussed with the platform. This case provides insights on how monitoring can be used in programmes with a visionary strategy, in the mode of external reflection and in relation to programme and transition field monitoring. The discussions about this one-off application show that the monitoring was largely perceived as credible, salient and legitimate. Platform members recognized the image presented and had a constructive discussion based on its results, although the description of the transition dynamics in terms of conditions and patterns were not used in this discussion.

- **The diversity of perspectives, changes and sustainability issues in the transition field can be addressed by monitoring the different transition scenarios.** The monitoring was used for opening up**.** For the transition field monitoring, first the main transition scenarios were identified by analyzing newspaper articles. These scenarios had different sustainability implications and when they were used to describe the current changes in the gas system, they revealed different transitions with different conditions, patterns and phases. After showing this diversity, the platform entered a discussion how synergies in these different transitions could be realized and negative trade-offs prevented. This is in line with the process of opening up described in chapter 4.
- **Monitoring the transition dynamics in the transition field was of direct relevance to the visionary platform new gas.** The platform new gas used its transition scenarios and identified structural opportunities and barriers for change to influence the expectations and agenda of other change agents in the transition field. This is in line with a visionary strategy. In 2008, the platform had just finished revising its transition scenarios was entering a phase of deploying its tactical and strategic activities. The monitoring results were used to discuss the most appropriate framing of these scenarios and the target audiences.
- **In a visionary programme like platform New Gas, transition scenarios, working groups and composition change over time.** Part of the case was an analysis of the changes in the transition scenario (both at platform level and individual transition pathways and related working groups) and set-up . This showed that the overarching transition scenario of the platform became more confident and comprehensive, that its composition changed over the years and that different working groups were initiated as the transition field changed. This makes monitoring these aspects relevant.
- **External monitoring was appropriate for the little institutionalized platform**. The platform had formal recognition by the government as part of its energy transition policy, it did not have a full-time staff, budget and budget responsibility and an organizational structure with advisory boards etc. The platform members therefore had limited time to participate in transition monitoring. This case may still be regarded as co-production, but not as very intensive co-production. This meant that external reflection was appropriate.

CHAPTER 9 MONITORING DESIGN FOR INNOVATION AGENDA ENERGY

9.1 INTRODUCTION

Under the Societal Innovation Agenda Energy on Energy (further referred to as Innovation Agenda Energy, or IAE) (EZ 2008b) a series of innovation programmes in the energy system was proposed in 2008. The transition monitoring framework was used to develop the general format for monitoring these programmes. This case only describes the 2009 design of this format. It presented an opportunity to use the TMon framework to monitor a set of comparable programmes for different sustainable energy technologies. This design features –among others- a regular re-evaluation of the project and programme progress in light of changes in the transition field. Several issues about the actual implementation of this format were left open to be detailed by the programme managers including the mode of monitoring. As a case study, this chapter explores the value of the TMon approach concerning the following aspects:

- **Programme strategy**. The IAE is based on a policy theory using an innovation systems analysis (explained in more detail later) that helps identify strong and weak points of the innovation system around a specific sustainable energy technology. Although the time frame and scope of the individual programmes were shorter than those of the programmes in the preceding chapters, the presence of a pre-formulated goal about the desired innovation system of a particular technology means these programmes can be classified as visionary rather than transformative.
- **Multi-level monitoring**. The design features all three levels for monitoring an innovation programme: the programme. its projects and its transition field. In addition, policy makers were also interested in higher levels of aggregation like the entire agenda and the several themes in the agenda. Although the design did not describe a specific way to aggregate the findings of the individual innovation programmes, a thought experiment is included in this chapter that illustrates how such aggregation could take place.
- **Regular redesign of monitoring activities**. The design leaves room for redesign in light of project, programme and transition field developments.

The context and background of the Innovation Agenda Energy will be described in the next section. In section 9.3 the design process is described. The final design is presented in section 9.4 and this is analysed in section 9.5. The chapter ends with a discussion and the lessons for transition monitoring in 9.6.

9.2 INNOVATION AGENDA ENERGY

In 2008, two major government programmes, the environmental programme ‘Schoon en Zuinig’ (Clean and Efficient) and the innovation programme ‘Nederland Ondernemend Innovatieland’ (Entrepreneurial, Innovative Netherlands) produced

a shared agenda: the Societal Innovation Agenda Energy (EZ 2008b). The different innovation programmes in this Agenda had a total budget of 440 MEuro from public means for the years 2008-2012 which was to be at least matched by private investments. This budget was allocated to some 30-40 specific innovation programmes grouped in seven themes (Green materials, New Gas, Sustainable Electricity, Sustainable Mobility, Chain Efficiency, Built Environment and Energy-Producing Greenhouse). These themes are based on the platforms in the Energy Transition Approach, like platform New Gas described in the chapter 8. As described in chapter 8, these platforms primarily worked at the tactical and strategic level. The Innovation Agenda Energy can be regarded as a policy instrument to strengthen, finance and coordinate especially the operational level activities. Table 9.1 provides an overview of the themes and their respective programmes. The agenda had a focus on innovations in early stages of market introduction.

Table 9.1 Innovation programmes and themes as listed in the Innovation Agenda Energy 2008

Theme 1: Green materials	**Theme 5: chain efficiency**
Bio refinery	Frontrunners energy reduction in the chain
Connecting chemical industry, agriculture and logistics	Precision farming
Sustainable production and imports of biomass	Process intensification
Modified plants for green chemicals and energy	Theme 6: Built Environment
Aquatic biomass	Towards an innovative energy-neutral neighborhood
Theme 2: New Gas	**Theme 7: The energy-producing greenhouse**
Market introduction micro-chp (combined heat and power production)	The energy-producing greenhouse
Green gas	**Cross-cutting programmes**
Theme 3: Sustainable electricity generation	Driving on natural gas and biogas
LUW programme	Developing a decentralized energy infrastructure (gas and electricity)
Developing 6000 MW of wind energy	Carbon Capture and Storage
Smart grids	Sustainable heat and cold
PV solar	Education
Fourth generation nuclear reactors	Reduction other greenhouse gases
Theme 4: Sustainable Mobility	ICT and energy-innovation
Basic infrastructure biofuels	Regulation and spatial planning
Electric vehicles	Sustainable consumption by governments
Sustainable urban transport	Materials research, connected to energy technology
Intelligent transport systems	Carbon-neutral cities and neighbourhoods
Innovative public bus transport	
Hydrogen mobility	

When the monitoring design started in 2009, most programmes in the IAE were not yet initiated. They were to be set-up and report according to an innovation systems perspective and have clear medium (2012) and long-term (2020) goals.

The Innovation Agenda Energy is organized as follows. IPE, the Interdepartmental Programme directorate Energy transition, was tasked to coordinate and implement the interdepartmental IAE. They aligned departmental policies in order to stimulate system innovations on the longer term, report on IAE progress and advice on necessary adjustments in the IAE and the annual allocation of funds. The IPE was to deliver the format for monitoring the progress of the programmes to the involved State departments (EZ 2008). The state departments were responsible for specific themes

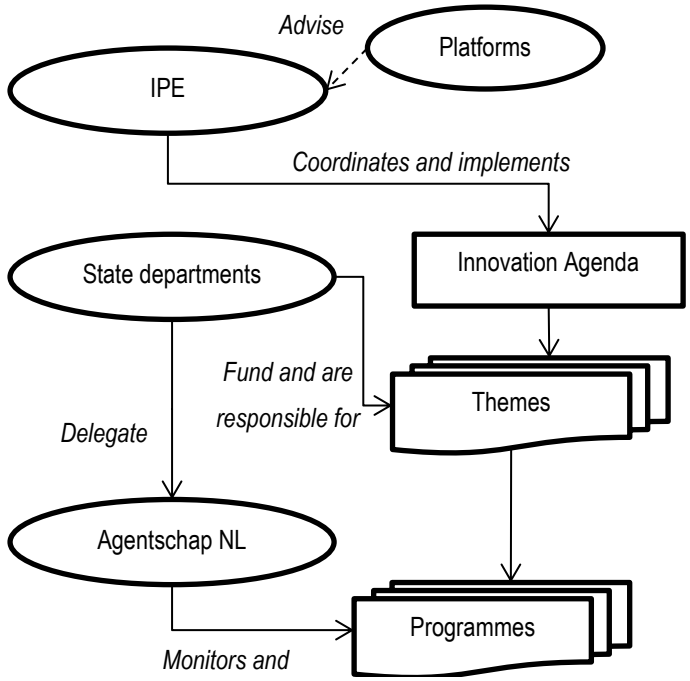

Figure 9.1 Overview of actors involved in the Innovation Agenda Energy

and the programmes in these themes. They committed funds and personnel and were as a result accountable for these programmes. They could delegate part of these activities to third parties. An important party was Agentschap NL, which had been delegated responsibility for managing individual innovation programmes. Agentschap NL was the primary subsidiary of the Department of Economic Affairs for a wider range of energy programmes.

9.3 DESIGN PROCESS

Early 2008 IPE asked TNO, DRIFT, Utrecht University , PBL (Netherlands Environmental Assessment Agency) and Agentschap NL to come up with a proposal to combine their monitoring approaches for the innovation agenda[38]. These four parties were each developing their own monitoring and evaluation (M&E) methods for transition programmes. The Innovation Systems Analysis (ISA) which formed the theoretical basis of the Innovation Agenda Energy was developed at the University of Utrecht (Hekkert et al 2007, Suurs 2009), PBL had previously done a series of evaluations of transition processes, in part based on the Innovation Systems Analysis (Ros et al. 2003; Ros and Montfoort 2006). Agentschap NL was developing a knowledge management system with an external consultancy called Pernosco

[38] *after which PBL decided that a type of monitoring in which the MNP would become a stakeholder in the innovation agenda would be a threat to its role as objective observer*

(Zagema et al. 2009) for all its programmes and projects within and outside the IAE. This group concluded that full integration was not possible primarily because the purposes and roles of the different experts and methods was felt to be incompatible. PBL aims to provide independent and objective information to parliament, the University of Utrecht was primarily research-driven and the TMon approach and The Agentschap NL knowledge management system were developed for day-to-day programme management. To better understand the user needs, four key players in the Energy Transition Programme were interviewed. They stressed that they did not want to bureaucratize the programmes. To them the monitoring should be "*practical, intelligent, allow for quick identification and intervention, and be more like a quick scan*". In November 2008 TNO sent a bid to Agentschap NL to develop and test a monitoring approach for the theme sustainable mobility based on the ISA, the knowledge management system developed by Agentschap NL and TMon approach. This meant that Agentschap was both the commissioner of the design (as delegated by IPE) and one of the main contributors.

The design took place between February and September 2009 and took three months longer than expected. The monitoring team consisted of M&E experts from TNO, Drift, Agentschap NL and Pernosco and a programme manager involved with the innovation programme Innovative public buses. This programmes would be the first test of the format. Throughout the monitoring design, programme managers from Agentschap NL and state departments and IPE representatives were interviewed and asked for feedback on prototypes of the monitoring design. The innovation programme 'innovative public transport buses and trucks' that had already started served as a case to explore the value of different monitoring prototypes.

The involved actors had different monitoring needs. IPE wanted to monitor the progress of individual programmes with respect to goal attainment in order to get information on the goal attainment of the entire IAE and to be able to compare different innovation programmes and themes. As a result they wanted a uniform approach for each innovation programme. This approach would be based on monitoring which activities were planned within in each programme, to what extent these activities realized their pre-defined goals and which developments required additional interventions. They saw monitoring as auditing. At the same time they understood the importance of learning and on-going programme development as a result of the uncertainties ad complexities of systems change and were open to a monitoring design that could accommodate these processes.

Programme managers from the departments and Agentschap NL wanted a broader focus. The programme managers emphasized monitoring to anticipate and adapt to changes in the transition field. They also wanted to use the monitoring to explore synergies between programmes. The civil servants from the Ministry of Transport and Water Management wanted a structured approach to help connect different activities and transfer lessons between programmes. They needed monitoring information on programme level for accountability purposes, including an eye on the relation with related policy programmes. A programme manager working for Agentschap NL and involved in the platform Sustainable Mobility added that the platform wanted an overview of related initiatives and being able to connect these. The same goes for Agentschap NL as a whole. It wanted a monitoring design for the agenda that was compatible to their existing monitoring and knowledge management systems for projects and programmes. The Department of Economic Affairs insisted on a close relation between the monitoring format and the innovation systems analysis, while Agentschap NL insisted on a close relation with the knowledge management system they were setting up.

9.4 MONITORING DESIGN

FOCUS

In line with the various user needs, the monitoring design integrates the TMon approach, the Agentschap NL knowledge management system and Innovation Systems Analysis (see later). Although IPE and the departments needed the programme monitoring to be aggregated at theme and IAE level, the focus was on individual innovation programmes and their relation to projects and the transition field. The design combines information for programme development and programme accountability.

THEORY OF CHANGE

The primary theory of change of the IAE is the technological innovation systems approach. The basic idea behind this approach is that innovation creates new opportunities, but that these opportunities may not be realized unless the prerequisite capabilities (knowledge, skills, resources) and markets are in place. This means that an innovation is not best described and explained by only looking at the characteristics of the innovation itself (ie diffusion, costs, performance). It is the interaction between the innovation and the social structure and processes in which it is developed and applied (the innovation system) that gives rise to successful or unsuccessful innovation. A range of perspectives have been developed to analyse these systems, like national innovation systems, sectoral innovation systems, local innovation systems and technical innovation systems (Carlsson et al 2002). These systems all have a different unit of analysis.

The technological innovation systems approach (Jacobsson and Johnson 2000) describes the development of a specific technological innovation through the continuous interaction between regulators, intermediaries, users and producers. The innovation systems analysis (ISA) is a method within this approach to analyse the dynamics in this innovation systems and is developed by Hekkert et al (2007). The ISA looks first at the structure of the innovation system. The focus becomes then whether seven crucial functions of this innovation system are performing well and reinforce each other. These seven functions have been identified through extensive empirical analysis. They are (1) entrepreneurial activities, (2) knowledge development, (3) knowledge diffusion through networks, (4) guidance of the search, (5) market formation, (6) resource mobilization and (7) lobbies to create legitimacy and counteract resistance. Research shows that in particular stages of maturity of an innovation different functions and interactions are dominant. For example in the R&D stage, knowledge management and diffusion (functions 1 and 2) give rise to new search paradigms and promises of the future potential of an innovation (function 4). In the entrepreneurial stage, these functions are connected to entrepreneurial functions (function 1) and so on.

In 2008, Innovation Systems Analysis of different sustainable energy technologies was conducted. In discussions between state departments, platforms, Agentschap NL and other stakeholders and experts, crucial technologies were selected and the main barriers in their development described with regard to the seven functions. These assessments formed the basis of the IAE. Goals for each programme were formulated to enhance the identified strong functions and remove identified barriers. Follow-up ISA's were planned for 2010 and 2012 to track the dynamics of the different innovation systems.

The consistent use of the ISA made it easier to develop a comparable monitoring approach for all programmes. However, it should be noted that the ISA was not necessarily performed in a uniform way and some of the programmes did not focus on a specific technology, resulting in problems interpreting and using the ISA. In an interview with programme managers from the programme Innovative public transport buses call the seven functions of the ISA a practical format to categorize earlier identified barriers and strengths. Nevertheless, there were concerns in Agentschap NL if programme managers really had a good understanding of innovation systems analysis. Looking at the different programmes in the IAE (Table 9.1), a large part of the programmes did not focus on a specific technology, and therefore not on a specific technological innovation system. Examples are programmes like 'education' , 'Connecting chemical industry, agriculture and logistics' and ' reduction of other greenhouses' (see table 9.1). In addition, the 2008 analyses were not consistently translated to programme proposals. The programme proposals within the theme sustainable mobility (Energietransitie 2008) for example showed little explicit use of innovation functions in the way programme goals were formulated. Moreover, in some programmes there were large gaps between individual programme proposals, the earlier ISAs in 2008 and the version of them presented in the Innovation Agenda Energy. After discussing this with ETP platform members, IPE, Agentschap NL, and innovation systems scholars, it was therefore decided that explicit use of ISA in the monitoring format would strengthen the IAE and offer great potential for evaluation and research, but that additional training of programme managers and exceptions for certain programmes were needed.

DESIGN

The designed monitoring format supports a cyclical programme development strategy. Initial plans are monitored, while the programme periodically reflects on new dynamics in the transition field, new insights from projects and the programme progress towards original goals. Based on this refection, the goals, programme portfolio etc. are reformulated, leading to a new programme description and adapted plans. This monitoring format was presented to Agentschap NL and state departments who were the potential users. They appreciated the approach for being simple but not simplistic.

The final format was described in Weterings and Taanman (2009) is based on four parts (see figure 9.2).

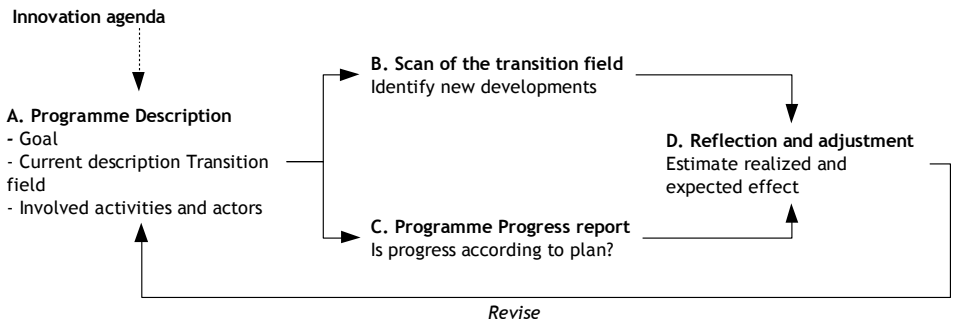

Figure 9.2 General monitoring format for the Innovation Agenda Energy.

Part A: programme description. The description includes all three levels of the TMon approach. At programme level, it consists of a description of the long-term policy goal or transition scenario to which the programme contributes and the concrete targets for the period 2008-2012. The description of the transition field consists of a template with three parts. The first part asks to describe the system boundaries: whether it is an innovation system around a single technology, a niche market or a region and how this system is related to the (larger) energy transition. The ISA is central to the second

part. This part describes the inhibiting innovation functions of the ISA. The functions are described with the indicators in table 9.2 that are scored from 1 (very weak) to 5 (very strong). For each indicator, the programme manager describes whether it is addressed in the programme. The third part is a list of other international, national or regional policy initiatives and programmes that are directly related to the programme including the persons who form the link between the programme and these strategic partners. The project level is described by listing all planned activities and projects including the actors involved in this. Activities can include the development of a new policy, experiments, network building, etc. and are related to the different innovation functions. The programme description offers a benchmark for the programme's progress, developments in the transition field and changes in the programme.

Table 9.2 Indicator set for the seven innovation functions

Function 1: Entrepreneurial activities # active entrepreneurs # demonstration projects # commercial projects quality of entrepreneurship Function 2: Knowledge development: # research projects quality of research # of (inter)national patents Function 3: Knowledge diffusion: # collaborations quality of collaboration Network composition # initiatives for knowledge diffusion visibility for the general public	Function 4: Guidance of the search: positive expectations by government and entrepreneurs about the value and usefulness of the innovation Financial structures to strengthen the innovation system Required government policy Visible support by government and 'champions' Function 5: Market formation: # paying costumers incentives for scaling-up Access to other market niches Function 6: Resource mobilization: Size of financial stimulation Size of venture capital # specially trained employees Function 7: Lobby by interest groups: acceptance by stakeholders strength of lobby to counteract resistance public acceptance

Part B: Scan of the transition field This step helps answer the question whether there are new developments in the transition field that may influence the identified barriers in the innovation system. To answer this question, the programme is expected to make a scan of the transition field. This scan is based on answering seven questions regarding transition scenarios, sustainability issues and changes in culture, structure and practices (see table 9.3). An updated ISA is an important part of this scan.

Table 9.3 format to scan the transition field

Dimension	*Question about the transition field*	*Possible consequences for the innovation programme*
Transition scenarios	What is the level of support for the programme scenario? Are there any other relevant scenarios on the future of the transition field?	What does this mean for the chances of realizing the programme goals?
Sustainability	To what degree do the sustainability ambitions of the programme match those in the transition field? Are there other relevant ideas what sustainability entails?	Is there a reason to adjust the sustainability ambition?
Changes in culture, structure and practice	Are there developments concerning the barriers and dynamics in the innovation system? What are the developments that put pressure on the dominant processes and mechanisms? Are there any new actors or networks that influence the playing field?	Which (new) activities and actors are needed to address barriers or take advantage of opportunities?

Part C: Programme progress report The programme progress report consists of a list in which the progress of individual activities is described, including to which innovation function the activity contributes (see table 9.2). These results are summarized with a coding based on four traffic light colours from red (hardly any effects to be expected, also not in the long term) to green (all desired effects will be realized in the desired timeframe). In addition, projects are asked to describe the response of stakeholders to the programme, best practices and room for improvement. The template is based on progress reporting used in Agentschap NL and compatible with the knowledge management system developed within Agentschap NL. The template should not be seen as 'hard measurement' but as a tool to support clear communication between programme managers and the programme commissioner (Putte and Thijssen 2009).

Part D: Reflection and adjustment This final part consists of a discussion between programme stakeholders to answer the questions if the programme will have the anticipated effect on improving the innovation system, and if the answers of the previous questions call for a modification of the programme. This discussion is based on the last programme description, information on programme progress and identified changes in the transition field. It is left to the specific programme when and with whom this discussion should take place (eg only within the programme team or by involving a wider range of stakeholders). The participants are not likely to fully agree on an answer, at least initially. Instead clarifying the different underlying arguments and issues has an important value in this reflective phase. In the end however, the participants need to close down on an up-to-date and shared understanding of the progress, effect and necessary adjustments to the programme. The adjustments lead to a revised programme description, including its goals and activities. This periodic re-description of the programme and its goals offers a (rolling) baseline to monitor the effects of the programme and offers a paper trail of the on-going development of the programme itself.

Based on this four part monitoring design, monitoring activities were initiated in the six months following the report. The first tenders for additional tests and applications of the format were issued in autumn 2009 and were conducted by Royal Haskoning, an external consultancy. Meanwhile, TNO tested the monitoring format for innovative public buses and presented the results to the directors general of six state Ministries. Agentschap NL's knowledge management system

was adapted so that information on project and programme development could be directly interpreted in relation to different innovation functions, for example by explicitly monitoring market formation activities in the programme. A year later, training sessions had started at Agentschap NL and the method was implemented in two innovation programmes with a total of twenty projects.

The monitoring report also discussed the conditions under which this format could be implemented. First, it was stressed that programme monitoring depended on good system to collect information on the programme's activities and projects, like the knowledge management system within Agentschap NL. It was advised to work towards a single standard that met the demands of the different programmes and was easily accessible.

Making good use of the monitoring design also depended on the right balance between inside information and external review. The insight and experience of those directly involved in the programme cannot be missed and monitoring cannot solely rely on existing documentation. Each programme needs to determine how many people should be involved in programme monitoring ranging from programme management only to the inclusion of platform members, project leaders and societal frontrunners. External experts may have in important role to critically reflection on the information, bringing in new insights on developments in the transition field and participating in discussion on steering suggestions to improve the quality and reduce the blind spots in the programme.

Programme managers or others who were given the task to do the monitoring should develop the competences to use this format. The responsible Ministries, Agentschap NL or other actors may all play a role in monitoring. It was also stressed that the described monitoring information was necessary for good programme management. The monitoring should therefore not be regarded as an *extra* investment, but as a systematized attempt to improve the quality of programme management.

Finally, the report pointed to issues on applying the monitoring format to the proposed programmes. First, not all programmes were built around stimulating a single technology, which may lead to problems in applying and interpreting the ISA. The report therefore advised that programme management retained freedom to make adjustments to the format and that additional piloting in 3-5 programmes was necessary to develop the approach further and learn what kind of customizing is necessary for different programmes.

9.5 ANALYSIS

MONITORING IN A VISIONARY PROGRAMME

The first thing that is apparent is that the different potential users of the IAE monitoring themselves had different ideas about the appropriate strategy: a planning strategy or a visionary strategy. The programme strategy determines how a programme defines its goals and therefore the appropriate type of monitoring. For planning strategies it suffices to monitor goal attainment of individual projects. For visionary strategies, this dissertation developed the broader TMon approach. It is therefore relevant to reflect on the actual IAE programme strategy: a planning strategy with consensus on a clear set of goals and means, or a visionary strategy that puts greater emphasis on the complex dynamics of social change and accepts that there is no full consensus on goals nor the knowledge and activities needed to realize them.

At first glance, the IAE seems to follow a planning strategy. Prior to programme implementation, an innovation systems analysis was conducted. In this analysis different stakeholders identified the weaknesses in the innovation system surrounding green gas, innovative buses, etc. The resulted in a shared understanding of the weak innovation functions to be addressed. The monitoring format let programme managers list which projects address each weak innovation function and how. This way, the 'problem' that the programmes address becomes increasingly structured and the programme strategy starts to resemble a planning strategy with predefined goals and means, and as a consequence, IPE called for a pure accountability approach.

On the other hand, the ISA is based on a view of innovation in which innovation processes unfold through numerous interacting actors and activities that together give rise to an emerging innovation trajectory. ISA describes the dynamics of an innovation system by looking at the *interaction* between different functions. In the monitoring format and the policy document describing the IAE, the focus is reduced to *isolated* functions and barriers. Programme managers and scholars who developed the ISA warned that this could be a weakness of the Innovation Agenda Energy. Also according to one programme manager "the focus on removing barriers as the goal of the innovation programmes is too narrow. Removing barriers alone is not enough to create change. Interacting vision, interventions and incentives are needed as well." The programme managers of the pilot case (innovative buses) furthermore expressed that they wanted to use monitoring to anticipate and adapt to changes in the transition field, compare and address synergies between projects and programmes, etc. Finally, different versions of the ISA's were not consistent in their analysis of the innovation system, indicating different views of the involved stakeholders. Comparing the 2008 ISAs, the Innovation Agenda Energy policy paper and the programme proposals were often inconsistent. They defined shows weak functions and key barriers differently.

This indicates that there may be less consensus about the programme goals and means than indicated in the programme proposals. Therefore the monitoring format for the IAE was designed for visionary strategies. This is reflected by the attention to periodic re-description of the programme, viewing programme progress in relation to the dynamics of individual projects and the larger transition field, and the importance of discussing these issues with different stakeholders.

MULTI-LEVEL MONITORING

The IAE monitoring format addresses the three levels of the monitoring framework, focusing on a specific innovation programme. The levels are monitored in each of the four steps. The first step describes the three levels for a particular programme, the second step focuses on the transition field, the third step on the different projects and the fourth step again reflects on all three levels.

At the start of the monitoring design, some users of the monitoring expressed the need to aggregate monitoring results on the level of themes and the agenda as a whole. Later in the design, the innovation programmes became the central focus and the final monitoring format did not discuss how the findings from monitoring individual programmes could be aggregated to theme or IA level. However as this type of multi-level programme may be also found in other programmes, it may be interesting to explore if such aggregation is possible for the IA, what that might look like and what opportunities for policy learning at theme level this may result in.

In principle the IA format can also be applied at theme level, in which case the innovation programmes can be regarded as the 'projects' within a theme 'programme'. The theme level is then used as the focal point instead of an innovation programme. Take the example of the theme sustainable mobility (see figure 9.3). The programme portfolio on sustainable mobility consists of six innovation programmes: basic infrastructure biofuels, electric vehicles, sustainable urban transport, intelligent transport systems, innovative bus transport and hydrogen mobility (see table 9.1). Their monitoring information provides a substantial part of the information needed on theme level. The innovation programmes describe the portfolio of the sustainable mobility programme (part A). Their transition field scans on the fuel infrastructure, urban mobility, bus transport etc. are niches in the larger mobility system (part B).Third, the reflection and adjustment of each innovation programme provides information for the theme's overall progress report (part C).

A full picture of the developments in sustainable mobility would require some additional information. For example on the sectoral innovation system, the sustainable issues and aggregated transition scenarios for the mobility sector as a whole.

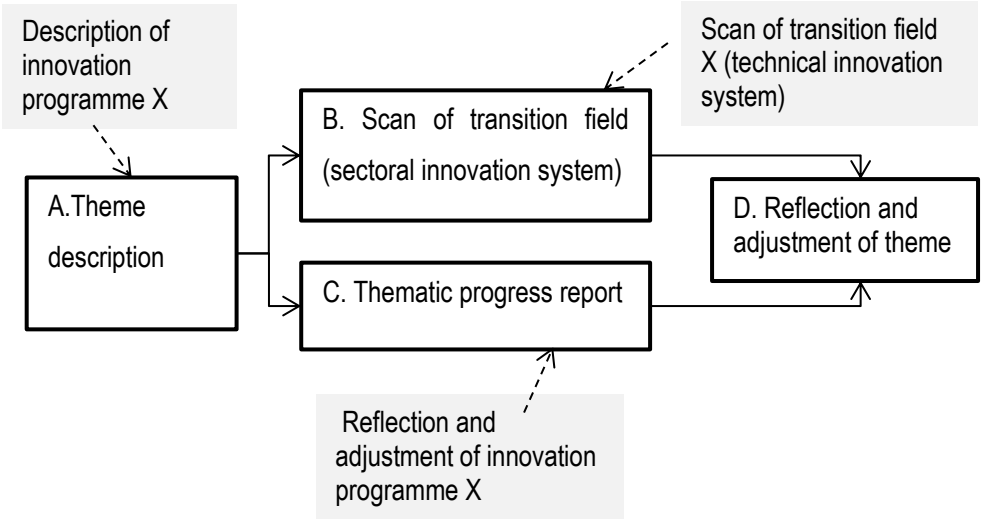

Figure 9.3: Aggregation of monitoring information on innovation programme X to the thematic level.

To explore the added value for policy learning of this type of monitoring at theme level, we may compare it to the way IPE initially proposed to do the theme-level monitoring. IPE suggested to only report whether projects were carried out and to what degree predefined targets were met: a performance measurement approach to monitoring. In the IPE proposal policy learning would be reduced to comparing successful programmes (those with projects that realize their targets best) to unsuccessful programmes (those that have difficulties to realize their targets). According Stame (2004) such information on goal attainment without information on the mechanisms and context is of limited value for policy learning, for addressing interdependencies and for establishing causal inferences. Policy learning requires judgement "which policy instruments in isolation, or in combination and in what sequence, are better suited to the actors situated in given contexts" (Stame 2004). The monitoring format of figure 9.3 would be capable to provide such information: it monitors individual programmes, but also their programme contexts and their role in the larger sustainable mobility portfolio. This way the monitoring format allows policy makes for example to compare programmes in a similar context (innovation system). This can provide valuable lessons on how to stimulate particular innovation system dynamics.

MONITORING REDESIGN

This format describes a cyclical process in which the programme is regularly redefined. The general monitoring format and the indicators for innovation system functions stay the same throughout these cycles. This provides continuity in the monitoring process and allows the different programmes to be compared. At the same time, which functions (and its indicators) a programme wants to address with which projects as well as transition scenarios in the transition field, etc. can be specified within each programme. The reflective aspects (especially in part D) are important as "*several judgements are possible based on the same performance and […] a joint picture requires a process of interaction between the main stakeholders*" (de Bruijn 2002).

9.6 CONCLUDING REMARKS

The monitoring design for the IA is the most comprehensive of this thesis as it retains many of the ideas behind transition monitoring. For example using a (complex) systems change theory, creating room for reflection on on-going transition dynamics, retaining the communicative and reflective character of transition monitoring and stimulating on-going improvements to transition programmes. At the same time, it is acknowledged that this case is also limited because it only describes the monitoring design and not its effect and working in practice. The salience, legitimacy and credibility of the format is therefore difficult to assess, although initial responses on the format were positive.

Care should be taken to draw conclusions for the value of the TMon approach. However, looking at the design only, several lessons can be drawn.

- **The IA design is a flexible design for visionary programmes.** The innovation programmes in the IA have been described as visionary because they are based on an integrated systems analysis, rather than on individual innovation projects. However they are not based on a transition scenario for the long-term other than that particular energy innovations should develop. The design consists of four monitoring activities conducted as the programmes develop. This design is flexible because it allows for changes in the long- and short-term goals, portfolio, changes in the transition field and lessons from individual projects. Although it is flexible, the main steps and indicators stay the same throughout the programme.
- **Monitoring progress and effects is possible based on the IA design**. On-going monitoring of progress and effects stresses the causal, temporal logic of interventions and effects. The four steps in the developed monitoring format make this possible. Goal attainment is monitored against a description of the programme's goals. At the same time, the programme description is allowed to change over time as a result of regular scans of the transition field, progress against the original goals and eliciting new issues from the projects. The changing programme descriptions leave a paper trail how the programme is adjusted and why and offers a rolling baseline to evaluate the effects and progress of the programme.
- **The monitoring design seems able to deal with programmes operating at different levels**. Studies on the production and use of evaluation reports in multi-level programmes conclude that we should no longer talk in terms of 'single studies' but in terms of 'streams of studies and data' (Stame 2004 in Leeuw 2005). Such flows contain information and results that are interpreted at different levels of abstraction. Users should be able to aggregate and de-aggregate information to suit their purposes. A thought experiment indicates that the

monitoring design may be useable both at the level of individual innovation programmes and at the level of overarching themes.

- **The design seems applicable to a number of comparable programmes** Because of the similar theory of change and scope of the IA programmes, the monitoring format can be applied to a larger number of innovation programmes, while retaining flexibility to specify the framework for each programme. The shared monitoring format may facilitate cross-programme learning, teach programme managers to use monitoring guidelines based on good-practice and develop necessary databases and other tools.

CHAPTER 10 ROTTERDAM CLIMATE INITIATIVE

"There is no need for an academic discussion on whether RCI is a transition or not. The report should not be this abstract, it should be more concrete. […] Drift should advise what we can do best to achieve our goal based on who we are and what we can do as RCI: help develop road maps to realize the desired effects. Not to compare it against some transition yardstick: away with the ideology. Drift should offer practical help to RCI and the danger of backfiring [of the critical report] should be prevented"

Anonymous participant of discussion on the first monitoring report 2009.

10.1 INTRODUCTION

This final case study is about the design and implementation of transition monitoring for the Rotterdam Climate Initiative. The Rotterdam Climate Initiative (RCI) is a regional programme to mitigate CO_2-emissions initiated in that started in 2007 with the aim to reduce CO_2 emissions in 2025 with 50% compared to the level in 1990. Over the period 2007-2011 different monitoring activities were initiated to monitor the transition dynamics in the Rotterdam area. In total three iterations were made in which the focus, design and mode of monitoring changed. During this period it became clear that the transition monitoring approach and transition management did not provide a good basis for monitoring RCI.

- **Programme strategy.** RCI appeared to follow a visionary strategy, because of its high ambition and its use of the vision to motivate other actors in the Rotterdam Area to contribute to this ambition. Over time it became clear RCI largely followed a planning strategy.
- **Modes of monitoring.** The transition experts initially had a strategy to go from external reflection to internal reflection, to management information. RCI expected a testing mode of monitoring.
- **Multi-level monitoring.** This case explores the relation between programme and transition field monitoring. In the transition field the governance of the energy system in Rotterdam and the energy system itself were monitored.
- **Regular redesign of monitoring activities.** After the first monitoring iteration proved unsuccessful, monitoring activities were renegotiated over time until they were more appropriate for the programme.

The case study is based on information participant observation in the design and analysis of the RCI monitoring, interviews with programme staff and analysis of programme documents. The chapter is structured as follows. Section 10.2 describes the RCI programme. Section 10.3 provides a short overview of the different monitoring iterations. The design, focus, theory of change and results of the first, second and third iteration are described in section 10.4-10.6. In section 10.7 these activities are analyzed. The first iteration had the most transition monitoring characteristics and was were the conflicting expectations of transition experts and programme managers became apparent. This iteration is therefore described in greater detail. This analysis shows how experts and managers had a conflicting view about what a

good programme strategy is. Dealing with these conflicts resulted in changing monitoring designs. Section 10.7 concludes and summarizes the lessons from this case.

10.2 ROTTERDAM CLIMATE INITIATIVE

Rotterdam is a major logistical and industrial hub in Europe and the city has some 600.000 inhabitants. One of the origins of the Rotterdam Climate Initiative is the regional R3 programme on clean fossils, energy-saving and sustainable energy in the industrial and harbor district. Former Dutch Prime Minister Lubbers played a large part in starting up the Rotterdam Climate Initiative. He and others saw a large opportunity for large-scale implementation of new technologies to reduce CO_2 emissions in Rotterdam, with a leading role for Carbon Capture and Storage (CCS). The Rotterdam Industrial complex with its refineries and (existing and planned) coal-fired power plants is a concentrated source of CO_2. As a transport hub, many of the infrastructural capabilities and actors that were needed to set up a system for CCS were present in Rotterdam and an experiment in which CO_2 is captured and transported to a nearby horticultural area was already taking place. However the RCI was more than a CCS programme. In the words of Lubbers: "*such an effort can only succeed when it includes both the port and the city*" (Lubbers 2008).

The Rotterdam Climate Initiative started in May 2007 with an initial funding of 80 Meuro until January 2011 to initiate and stimulate developments that had to lead to a 50% reduction of CO_2-emissions in 2025 compared to 1990[39]. In 1990 the CO_2 emissions in the Rotterdam region amount to 24Mtons growing to 29 Mton in 2005. In a business as usual scenario, these emissions would further rise to 46Mton in 2025, mainly because of new coal-fired power plants that had received permits and started construction by the time RCI started. The largest CO_2 source in 2025 would be industry and energy production (92%). Mobility (5%) and the built environment (3%) would make up the remainder of the emissions (DCMR 2007). The RCI ambitions were to reduce 2025 emissions from the projected 46 Mtons to 12 Mtons (a staggering 3/4 in only 18 years), primarily through the introduction of large-scale carbon capture and storage (CCS). CCS was expected to account for 60% of the emission reduction. Co-firing of biomass in coal plants would account for an additional 15% (RCI 2008a).

RCI was established by four (strategic) partners: the Rotterdam municipality, the Port Authority (a company that runs the port with two shareholders: the municipality and the State), Deltalinqs (the spokesman for over 600 companies in the port and industrial area) and DCMR (the environmental agency of Rotterdam). The organization structure of RCI consisted of a programme office, supervised by a management team with representatives from the four partners. The management team reported on programme progress to the RCI board chaired by the mayor of Rotterdam. The RCI council, chaired by RCI –initiator and former Prime Minister Lubbers reflected on and advised both the board and management team.

The programme was divided in five sub-programmes with separate targets: Energy port (to stimulate a 50% reduction in the port and industry), Sustainable city (50% reduction in the built environment), Sustainable mobility (50% reduction), and two supportive sub-programmes: energizing city (to generate commitment with public agencies, business and

[39] *After 2011, RCI merged with the on-going climate adaptation programme*

inhabitants) and innovation lab (to support energy innovations and marketing of Rotterdam as clean and innovative) (RCI 2008b). At start-up, the programme supported a large number of projects and activities ranging from incremental (eg speeding up the installation of LEDs in streetlights) to very innovative (eg an experiment with industrial shrimp farming using waste heat).

10.3 OVERVIEW OF THE MONITORING ACTIVITIES

The monitoring team of RCI consisted of transition experts from DRIFT (the Dutch Research Institute for Transitions) in collaboration with DCMR (the environmental agency of Rotterdam) and the RCI management team. It took place in three iterations (see table 10.1). The first iteration evaluated RCI with respect to transition management criteria and analyzed its relation to the Rotterdam energy system. The second iteration consisted of a workshop with different programme managers to make the transition scenarios for various sub-programmes more explicit. The third iteration consists of a number of indicators to monitor the changes in the Rotterdam energy system.

Table 10.1 Overview of the monitoring activities for RCI

Iteration	***Duration (approx.)***	***Focus of programme monitoring activities***
I	2008-2009	Report (Loorbach, Van der Brugge et al. 2009): Evaluation of RCI with respect to transition management criteria, evaluation of the relation between RCI and the Rotterdam energy system
II	2009	Clarifying transition scenario for the sub-programmes energetic city, sustainable city, sustainable mobility and innovation lab through a workshop with staff of the sub-programmes
III	2010-2011	CO_2 emissions and niches within the non- harbor sub-programmes

10.4 FIRST ITERATION

FOCUS

Discussions about transition monitoring started with R3 and DCMR and predated the RCI. In these discussions, different monitoring needs were identified and prioritized. Ttransition experts would focus on monitoring transition processes in Rotterdam, DCMR would monitor the CO_2 emissions and project results. These three combined -the transition dynamics, the resulting CO_2 emissions and the results of projects – would form the baseline to regularly evaluate, reflect on and improve the RCI programme.

The transition experts wanted to evaluate the extent to which RCI was a transition programme in 2008 to 'transitionize' the programme. The original project proposal of March 2008 explained that "*Transitions and Transition management thinking are proposed as a shared (…) framework and language*" to "*reflect on the contribution of the RCI to a regional sustainability transition*" and "*prevent that RCI will become more and more focused on short-term implementation and only on the reduction of greenhouse gas emissions*", by providing "*reflection when asked to or when felt necessary by DRIFT".* This proposal is in line with initial interviews with the 2007/2008 RCI chairman, Arjan Dikmans. He warned not to approach RCI as a project implementation programme. According to him, such a focus on individual projects would go at

the expense of the larger aim to inspire and motivate organizations across Rotterdam to become involved in the Initiative and internalize its goals. He did not want RCI to direct and control the changes: " *if I have to control everything, the change will be too slow for me*". Instead he aimed to inspire and motivate other actors by providing good examples, engaging actors in discussions about why they did not initiate changes already and, if necessary, provide additional financial -or other- resources.

The strategy of the researchers was to develop indicators in three steps: (1) external reflection on the transitional character of the programme, (2) based on these results, engage in programme wide internal reflection about the implications of being a transition programme and (3) define concrete indicators on the programme and transition process for operational management information. The monitoring focused on the transition field and programme levels of the monitoring framework.

THEORY-OF-CHANGE

Different transition theories and concepts were used to draw up indicators. Most important was the transition management model as developed by Loorbach (2007, 2009). This model (also described previously in other chapters) is based on three levels at which transition processes can be influenced: the strategic, tactical and operational level.

Prescriptively, each of the three levels has its own scope, goals, means, actors and relation to the current system (see table 10.2). For example the strategic level focuses on the long-term and an aggregated level. The goal is to develop a sustainability vision or 'transition image' based on an intensive participatory integrated assessment in which the underlying mechanisms of current unsustainability issues are explored by an arena of frontrunners. According to Loorbach (2007,2009), this implies that this arena must be formed outside the main policy arenas as a shadow network. The transition management guidelines can be used as criteria to assess the extent to which RCI was a transition management programme.

Table 10.2 Transition management criteria derived from Loorbach (2009)

Level	*Criteria*
Strategic	✓ Scope: system-wide (eg a whole sector or region) and long-term (~30 years) ✓ Goal: creating a long term vision of the system, describing the outlines of the desired, fundamental system change and the sustainability issues that this changes addresses ✓ Means: participatory integrated assessment, co-production ✓ Actors: developed by an arena with a small number of diverse frontrunners ✓ Relation to regular (policy) system: operates as a 'shadow-network' outside (but in close contact with) the main policy structures
Tactical	✓ Scope: sub-systems (eg a sub-sector or regional energy production) and over a period of 1 or 2 generations ✓ Goal: creating a diverse portfolio of pathways that describe the change for sub-systems and have more concrete shorter-term objectives; addressing and removing regime barriers. ✓ Means: agenda-setting and network building ✓ Actors: diverse representatives of key organizations with 'sufficient authority and room to maneuver ✓ Relation to regular (policy) system: as choices about priorities and attribution of resources become clearer, conflicts with the regime come in the open
Operational	✓ Scope: local and 5-10 years ✓ Goal: learning about innovative system options ✓ Means: high-risk, high potential and iconic innovation projects ✓ Actors: cooperation between business, knowledge institutes, government citizen and intermediaries ✓ Relation to regular system: fundamentally different from existing culture, structure and practices

The transition management model can also be used descriptively. In that case, the strategic level is used to describe all activities and discussions concerning the long-term. This includes processes of vision development, long-term strategies and debates about cultural issues like norms, values, sustainability and identity. At the tactical level, the social and physical structures of a system can be described by rules and regulations, organizations, networks and infrastructures. The operational level includes local practices with an emphasis on innovation projects (Loorbach 2009).

The second theoretical frame used, was a mixture of the 'stocks and flows' model (Grosskurth and Rotmans 2005) and the multi-level model that describes transition processes through an interaction between macro-level trends, the regime and niches (Rip and Kemp 1997). This frame was used to describe the physical and energy aspects of Rotterdam. The Rotterdam area can be described as a system consisting of stocks and flows. Stocks are large and slowly changing forms of social, economic and physical capital like the housing stock, the demographic composition of Rotterdam, green spaces and the composition of the harbor industry. Flows between these stocks describe the mutations in these stocks: green space is converted to housing, a changing harbor industry leads to a changing labor market, etc. The stocks are influenced by macro and micro level developments. Macro-level trends like the depletion of fossil fuels etc. are comparable to the landscape dynamics in the multi-level model. Micro-level niches provide an alternative system in which new stocks and flows are constructed.

DESIGN

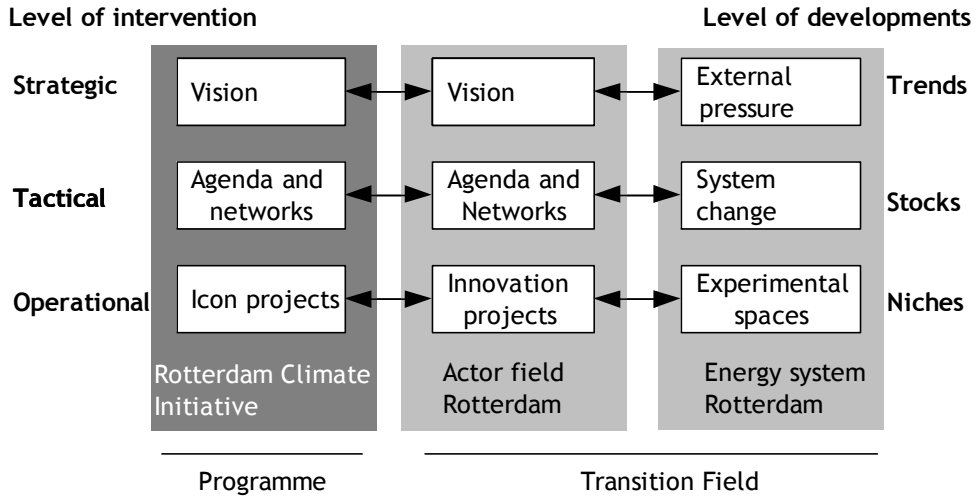

Figure 10.1: Monitoring framework as adapted for RCI

The monitoring design was based on the programme and the transition field level (see figure 10.1). The RCI (left column) is described with respect to its strategic, tactical and operational activities based on prescriptive TM criteria. The transition field is divided in two parts. The middle column describes the strategic, tactical and operational activities in the Rotterdam area. The right column describes the energy system in Rotterdam in more physical and functional terms: large external trends or pressures on the system, the changes in the system itself and experimental niches.

Transition management was used in two ways. First, the different RCI activities were described in relation to the prescriptive transition management model. Second, transition management was used to analyze whether the larger governance system in the Rotterdam area was oriented towards a transition. For example if key visions and strategic agendas in the city were in line with the RCI ambition, if structural barriers were addressed, etc.

The report offered a set of proposed indicators based on the framework. Table 10.3 lists the proposed indicators.

Table 10.3 Management indicators for RCI as suggested by first monitoring report

RCI	***Actor field Rotterdam***	***Energy system Rotterdam***
Development of the RCI transition scenario	Shared problem perception of the sustainability issues in Rotterdam	Developments regarding Carbon trade market
	Convergence of visions with respect to sustainability	Investment climate
	Sense of urgency	Depletion of fossil fuels
	Media-buzz for RCI ambition (#articles)	
	Awarenes of RCI ambition by citizens (annual survey)	
	Awarenes of RCI ambition by businesses	
Number, composition and goals of voluntary agreements, consortia and innovation networks stimulated by RCI	New actors in Rotterdam relevant for RCI	Electricity use/inhabitant
	Legal and financial structures in support of sustainable development	Electricity use Small and medium size businesses
List of key institutional and structural barriers, strategy to deal with them and progress	Number of voluntary agreements, consortia and innovation networks, including their progress and perceived opportunities and barriers	Growth of harbor
		Diversity of energy production sources
		Sustainable energy production
		Number of public transport kms
		# vehicles with alternative fuels
		# houses with energy A-label
		Km2 green roofs
		# of sustainability related curricula
		Benchmark regional innovation capacity (compared to other industrial and harbor centers and other Dutch regions)
Cohesion and diversity portfolio	# innovative start-ups	# experimental spaces
	# of innovations unique to the Netherlands	
Goal attainment (currently monitored by DCMR)		
Development iconic projects (deepening, broadening, scaling up)		

Steering suggestions would follow from combining these indicators. Examples are whether transition scenarios in the RCI programme and its sub-programmes were incorporated with other scenarios or visions in Rotterdam (RCI top row, combined with actor field Rotterdam top row) and progress reports on a small set of iconic projects (RCI, bottom row) based on the TPLZ format (see chapter 6).

RESULTS

From September 2008 to February 2009, the monitoring team of transition experts[40] evaluated the transitional character of RCI (Loorbach, Van der Brugge et al. 2009). The report was based on RCI documents, ten interviews with people in and around the RCI, participant observation and workshops with programme staff

[40] *led by Derk Loorbach, other members of the team were Rutger van der Brugge, Carolien Hoogland and Mattijs Taanman. Rutger van der Brugge was primarily responsible for the systems analysis and editing of the final report, Carolien Hoogland for the data collection, facilitation and interaction with the programme, Derk Loorbach for the set-up and conclusions of the report, the actor*

The report described the transition dynamics based on the nine elements in the monitoring framework (see fig. 10.1). Rather than a factual description of the transition dynamics, the report read as a critical reflection on the programme from a transition management perspective. This reflection contained many arguments for a strategy that was more in line with transition management thinking supported by examples from RCI and the dynamics in Rotterdam.

An example of the type of reasoning and reflection is the following. Under the header of 'visions in the actor field Rotterdam' a table was provided that lists nine other vision documents on Rotterdam. This table showed that the majority of vision documents did not explicitly refer to the RCI ambition to reduce CO_2 emissions. Immediately after this remark the report stated: "*Clearly, the different visions are focused on the specific policy fields of the involved organizations and few connections are being made to connect these visions and fields. The brings the risk that RCI is used as an excuse [by these organizations] to not do anything about CO_2 emissions. Sustainability should be an overarching theme for the development of the city. (…) Organizations do not currently reason from an integral challenge, which may result in tensions in the near future, for example between the task to construct new housing and the energy ambitions regarding housing, between the congestion issues and clean mobility or between investments in physical and social themes. (…) It seems obvious to think about the future challenges of Rotterdam in a more integrated and cross-sectoral way*."

Table 10.4 (next page) summarizes the main differences between RCI and the TM prescriptive model.

analysis and presentation and discussion of the results and I was primarily responsible for the monitoring design and the analysis of the RCI Programme. Jan Rotmans commented on the draft of the report.

Table 10.4 Assessment of RCI in relation to transition management criteria

Level	***Criterion***	***Agreement with RCI***	***Explenation***
Strategic	Scope: system-wide (eg a whole sector or region) and long-term (~30 years)	+	High ambition, although at a shorter term (18 years compared to 30)
	Goal: creating a long term vision of the system, describing the outlines of the desired fundamental system change and the sustainability issues that this changes addresses	0	High ambition, but no integral sustainability definition (CO_2 only). Desired system changes well-described for the harbor, but not for the city. Debatable whether CCS and co-firing biomass in coal plants implies a fundamental change / real transition
	Means: participatory integrated assessment, co-production	-	No integrated systems analysis conducted
	Actors: developed by an arena with a small number of diverse frontrunners	-	Developed by the largest players in Rotterdam
	Relation to regular (policy) system: operates as a 'shadow-network' outside the main policy structures but in close contact	-	Closely connected to main policy structures
Tactical	Scope: sub-systems (eg a sub-sector or regional energy production) and over a period of 1 or 2 generations	+	Five sub-programmes defined each operating in a different sub-system
	Goal: creating a diverse portfolio of pathways that describe the change for sub-systems and have more concrete shorter-term objectives; addressing and removing regime barriers.	0	Well defined transition pathway for CCS and biomass in the sub-programme Sustainable harbor. Pathways for other four sub-programmes ill defined. Not very diverse portfolio of pathways, because the success crucially depends on CCS.
	Means: agenda-setting and network building analyzing regime barriers through scenario-building	0	Difficult to generate an overview, but many examples of new networks and agendas. Little attention to scenario-development
	Actors: diverse representatives of key organizations with 'sufficient authority and room to maneuver	+	Difficult to generate an overview, but many examples that this is the case
	Relation to regular (policy) system: as choices about priorities and attribution of resources become clearer, conflicts with the regime come in the open	?	Conflicts are probably present but RCI emphasizes the opportunities and inspiring initiatives over conflicts
Operational	Scope: local and 5-10 years	+	Many operational activities
	Goal: learning about innovative system options	0	Difficult to assess. A large emphasis on showing results.
	Means: high-risk, high potential and iconic innovation projects	0	Some high-risk and high potential, but other projects incremental
	Actors: cooperation between business, knowledge institutes, government citizen and intermediaries	0	Cooperation primarily between government, business and intermediaries. Small direct involvement of citizens.
	Relation to regular system:, fundamentally different from existing culture, structure and practices	0	Some high-risk and high potential, but other projects incremental

The table reveals many differences between the TM model and RCI[41]. First, the programme was not explicit about the changes that realizing a 50% CO_2 reduction implied for sustainable mobility and the sustainable city. It paid little attention to scenario-building and integrated analysis and did not work from an integral sustainability definition. Second, the programme was not driven by innovative 'outsiders' but by the key players in Rotterdam. For example the RCI board consisted of the mayor, the CEO of the harbor company, etc. Third, in terms of the operational projects, RCI supported several very innovative and iconic projects like a sustainable dance club, a shrimp farm based on waste heat from industry, one of the largest PV roofs in the Netherlands on the new train station etc., but also many incremental projects like replacing street lights for LEDs. For other topics like institutional barriers, too little information was available to paint a clear picture. All in all, it was questioned whether RCI actually wants to stimulate a transition and if transition management would be a more appropriate starting point for the programme. In addition, the report asked RCI to reflect on its large focus on CCS. CCS was controversial and if CCS failed to materialize, there was no plan B to realize the emission reduction. The report listed some of the controversies around CCS and suggested that should address these controversies.

In addition to the analysis of RCI and the actor field in Rotterdam, also a limited systems analysis was done. This analysis showed many changes in the Rotterdam energy system like new biofuel plants, different spaces for experimentation and new sustainability oriented education curricula. However, it also showed that more data collection is needed.

The report concluded that in 2008, the programme had significantly contributed to a transition by creating several necessary conditions. The high level of ambition expressed by the partners was a signal for actors in Rotterdam that major changes should, could and would be realized in Rotterdam. It created a buzz in the media and elsewhere. In addition, a growing number of actors became involved in sustainable development. The city of Rotterdam effectively presented itself as a frontrunner with respect to CCS, biofuels and the built environment. Finally, a broad range of sector agreements, consortia and frontrunner networks were created and a large number of experiments and projects started with visible, although small-scale results. However, not enough momentum had been achieved yet in terms of structural change. In other long-term visions published by the municipality among others, the biggest challenges for the city were defined in terms of economy, safety and transport and not connected to the climate ambition. In addition, external pressures like the credit crunch and dropping fossil fuel prizes were detrimental to investments in sustainable solutions and the sense of urgency. The report offered five recommendations:

1. Under the heading "transition or no transition?", the report signaled that there was no agreement within RCI if the target implied a fundamental change for Rotterdam (city and port) or not. The recommendation was to think this through with partners and frontrunners.

2. Sub-programmes like mobility and built environment. had no worked out transition scenario that describes *how* mobility and the built environment should change in order to meet CO_2 targets. This makes it difficult to define

[41] *This table was not literally used in the RCI report, but it captures the main line of reasoning well.*

intermediary goals and, consequently, monitor goal attainment. The scenario that RCI developed for CCS was a positive exception.

3. RCI had to become more active in finding and supporting frontrunners inside and outside the partner organization. Now, it primarily relied on the largest players in Rotterdam.

4. As a side effect to the programme's growing visibility, the report warned RCI to be cautious about its relation to the partners. These partners should themselves actively incorporate the mitigation challenge in their operations and not delegate this responsibility to the RCI programme.

5. Last, the report suggested developing more mass in its activity portfolio but also to focus on a limited number of transition experiments that combine different innovative ideas and partners and embody the RCI ambition. The CCS pilot was one of these experiments.

REACTION TO THE MONITORING REPORT

In January 2009, a new RCI management team starts. When the monitoring report was presented to them, they were very critical and question its use for the RCI. The management team had expected an objective description rather than a critical reflection. They were not convinced that RCI should be evaluated with respect to transition management criteria. The management team did not want to discuss the report in the RCI board, because questioning the commitment to CCS was not considered to be constructive at the time. The report was also not included in the 2008 annual RCI report. DCMR was instructed to supervise a revision of the report based on the comments of members of the management team. The report was never published by RCI[42]. In part to prevent upheaval, on which the RCI was right. Years later in 2013, opposition party Leefbaar Rotterdam issued a press statement:

"*A report from 2009 on which "Leefbaar Rotterdam" laid its hands, is very critical about the ambition to cut CO_2 emissions in half by 2025. [..] The report, commissioned by the Rotterdam Climate Initiative (RCI) states that RCI lacks a vision how and why the ambition should be realized. It describes a strong focus on CCS; a very expensive and technologically uncertain trajectory. [..] If this report would have been available at the time, the municipal council would have been much better informed."*

The reactions of programme management to the report are further analyzed in section 10.7.

10.5 SECOND ITERATION OF MONITORING ACTIVITIES

FOCUS

The 2008 annual RCI report described that RCI would work with transition experts to evaluate if the right steps were being taken to realize the desired energy transition. These steps were to be translated into indicators to determine whether RCI was on track to realize its ambitions (RCI 2009). Continuing in the same manner was not desired by RCI

[42] *Although it has been published on the Drift website several years later*

managers and transition experts and they renegotiated what activities should be next. In the new assignment transition experts helped to develop a transition scenario at programme level and for different sub-programmes, with the exception of the sub-programme sustainable harbor. The representatives from the harbor (with their focus on CCS) were most critical of the monitoring report. The focus thus shifts to those sub-programmes where programme team members were more positive about TM. For the transition experts, this new focus was in line with the recommendations from the monitoring report to further develop transition scenarios and at least partly in line with the original monitoring strategy in which the next step was to stimulate internal reflection within RCI . For RCI this new assignment addressed the need to develop an action plan for the city for the period 2007-2010 and to establish a longer term outlook what should happen after 2010, when the municipality had to decide on new funding of the RCI.

DESIGN

The RCI monitoring framework (figure 10.1) was reformulated in nine open questions (see table 10.5) to reflect on the transition scenarios of each sub-programme, make them more explicit and translate them into indicators. To guide programme managers through the questions, the questions were put in a sequence to construct a consistent storyline capturing the goals, means and expected outcomes of the programme.

Table 10.5 The monitoring framework reformulated as a set of open questions to discuss within the RCI programme. The numbers refer to the sequence of the questions

	RCI	***Actors***	***City of Rotterdam***
Strategic	1. What is the goal in this sub-programme for 2025?	2. Which actors in Rotterdam have comparable goals? Which actors have conflicting goals?	4. Which trends influence whether I can reach my goal but are beyond my scope of influence?
Tactical	6. What is the role of my sub-programme in organizing these structural changes?	5. What organizational and institutional changes are necessary in the next five years? Who are my partners to realize this and what should they do differently?	3. What physical changes in Rotterdam are necessary in the next five to reach my goal?
Operational	8. What are the most innovative, visible and inspiring projects within my sub-programme? How can we support these?	9. Who should be influenced by these projects and what should they do differently?	7. What are the most suitable places in Rotterdam to locate exemplary projects?

RESULTS

The questions were answered in a workshop with the leaders of the different sub-programmes in April 2009. For some sub-programmes like sustainable mobility, it appeared quite easy to answer these questions, but others had trouble answering them, revealing an ambiguous or absent transition scenario. In follow-up meetings and interviews, transition experts iteratively refined the answers. Table 10.6 illustrates the answers for the sub-programme sustainable city.

Table 10.6 Indicators on goals and developments at operationa, tactical and strategic level for the sub-programme sustainable city

RCI	***Actor field Rotterdam***	***Energy system Rotterdam***

Strategic	**Goal**	**Partners**	**External trends**
	A minimal reduction of 50% of the use of fossil fuels for housing, work and recreation while contributing to a strong economy and attractive living areas.	*Likely partners* Housing cooperations, installation branche, energy companies like NEM and Eneco , municipal, provincial and national government, project developers, sports clubs, community centres *Potential partners not yet reached* small and medium-sized businesses, house rental organizations, investors	Demolition rate, new construction, energy crisis, financial crisis, global sustainability awareness, rules and regulations, local leadership, individualism
Tactical	**Organizational and institutional changes**	**Tactical Outcomes**	**Necessary physical changes**
	Transition platform housing cooperations, voluntary agreements with project developers and cooperations, city policy	<u>Cooperations like Aedis, project developers</u> *Minimal short-term expectation:* 1 exemplary project *Maximal expectation:* Partners become structural frontrunners in the sector <u>Municipality</u> *Minimal short-term expectation*: take up the challenge internally *Maximal expectation*: implement energy reduction in every construction project	Substitution of natural gas by biogas and industrial waste heat Sustainable energy production and purchase in cooperative models Wind locations in the city Energy saving consumer behaviour
Operational	**Exemplary projects:**	**Outcomes exemplary projects:**	**Experimental spaces**
	Heat agenda (capacity development, policy development, pilots) Local translation to communities (focus on learning and agenda setting) City council “motion Bonte”	…	Public building projects Frontrunner associations of house owners

By summer 2009, more operational development of these indicators stopped for various reasons:

- Transition experts and programme managers had too little time to further develop these indicators. It was difficult to find the time for more meetings to further refine them
- The RCI management team wanted a small, clear set of indicators. This format would result in a large number of indicators for the four programmes and it remained unclear who would be responsible for data collection
- RCI developed a new action plan with short and medium term deliverables for each programme in parallel. Aligning the action plan and transition monitoring was attempted by transition experts. In the end however, the action plan had the most priority for the programme managers and support by the management team.

10.6 THIRD ITERATION

FOCUS

In discussions between the Rotterdam area environmental agency (DCMR), RCI and transition experts, indicators were developed that connected the total RCI CO_2 ambition to the working plans of the various sub-programmes. DCMR proposed to collect the data and implement the monitoring as part of their existing CO_2 monitoring and project monitoring.

DESIGN

The final set featured only indicators on the Rotterdam energy system (see table 10.7) based on the first and second iteration. For each theme (mobility, built environment and industry) two types of indicators were formulated. A relative CO_2 emissions indicator and a limited number of indicators for those structural changes that realize the most CO_2 reduction. Relative CO_2 indicators like CO_2/m^2 living or work surface for the built environment were chosen to exclude the effects of volume change like the construction or demolishing of new buildings. These developments were considered to be outside the scope of influence of RCI. Excluding them meant that any change in the indicator values can be interpreted as the effects of more energy-efficient technologies, sustainable energy and lower energy demand. These indicator do not show whether the change is the average effect of autonomous developments and incremental changes or if it is also the result of more fundamental underlying changes, especially those changes that RCI wants to contribute. Therefore a few additional indicators were included. For the built environment these were the percentage of sustainable houses, percentage of sustainable companies and percentage of energy neutral municipal buildings. Sustainable houses are houses that are heavily renovated to make them more energy-efficient (retrofitted), connected to the heat grid or with sustainable energy produced in or on the building. These three types of houses were all stimulated by RCI. RCI had trouble reaching small and medium sized companies. To reach this target group, DCMR produced a list of energy measures that these companies could take. Sustainable companies were defined as companies that had taken all the relevant measures from this list. The municipality wanted to play a leading role in showing that CO_2 mitigation is possible and desirable. The last indicator therefore refers to municipal buildings that are self-sufficient in their energy needs or belong to the most efficient buildings.

These indicators were expected to help clarify strategies and goals and stimulate RCI partners to systematically start collecting this information and through this process become more involved and aware of the climate ambition.

Table 10.7: RCI indicators in April 2010 (printed with permission from DCMR).

	Indicator	***Explanation***
Built environment	**CO_2/m^2**	**Emissions per m^2 housing or working area**
Housing	% sustainable houses	total # houses connected to the heat grid, retrofitted or with renewable energy production
SME	% sustainable companies	SME's that have implemented a list of energy measures developed by DCMR
Municipal Buildings	% energy neutral objects	Municipal buildings or objects that are self-sufficient or have an energy A label
Mobility	**CO_2/km**	
	% sustainable personal mobility kms	Sum of avoided car-kms, kms driven with electric vehicles or biofuels
	% sustainable transport kms (road)	Kms driven with biofuels
	% sustainable transport kms (water)	*To be determined later*
Industry	**CO_2/ product**	*To be determined later*
	% green raw materials	
	MWh CO_2-free energy	Energy with carbon capture or produced with biomass or wind

RESULTS

Refining these indicators and setting policy ambitions (eg 2010, 2015, 2020, 2025) remains an on-going process closely related to other planning activities in the RCI. Transition monitoring results are presented as a separate chapter of the sustainability monitor. Figure 10.2 shows (in Dutch) the results for the built environment in terms of CO_2 emissions/ m^2 for houses, municipal buildings and SME's respectively (Programmabureau Duurzaam 2012).

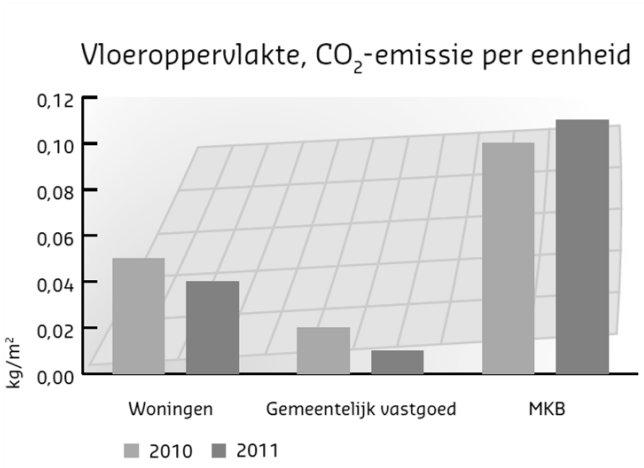

Figure 10.2 Carbon emissions per m^2 for (left to right) housing, public real estate and SME's (Programmabureau Duurzaam, 2012)

10.7 ANALYSIS

The primary interest of this case is to identify and understand why the first monitoring report was rejected, how this influenced the remainder of the monitoring activities and what this means for transition monitoring. Because the

monitoring needs and the TMon approach did not match, the case analysis is slightly different from the analyses in previous chapters. Instead of analyzing the relation to the programme strategy, mode, multi-level nature and regular redesign separately, the analysis will analyze them together in an effort to identify why TMon was unsuccessful

The RCI management team criticized the credibility, salience and legitimacy of the first monitoring report. Interestingly the transition experts evaluated the credibility, salience and legitimacy of the monitoring differently. The management team questioned the credibility of the first monitoring report. They did not consider the monitoring to give an objective account. For example they asked if the conclusions reflected the opinion of the interviewed stakeholders or the opinion of the researchers. The researchers felt that they had made clear that they were asked to do the latter: a theoretical reflection on the programme from transition management perspective with the aim of developing indicators that could later provide a more technically adequate description of the state of the programme and the transition dynamics. Where RCI sought credibility in data collection, the researchers defined credibility (at least for this first report) as expertise.

The management team was also critical about the salience of the recommendations. An example was the recommendation to "*provide a more systemic inventory of the developed knowledge and learning experiences and try to communicate these more systematically*". While the researchers felt this was an important suggestion, it offered little hands-on guidance on how to actually do this. In response to the question what the management team would consider to be salient recommendations, they suggested providing an answer on how the planned wind turbines in the Rotterdam harbor could best be realized. This illustrates that they understood salience primarily as helpful to implement the programme and not helpful to reflect on its general set-up and goals. Part of this critique was that TM jargon was considered too academic and vague. The transition had in their opinion already tried to restrict the amount of jargon in the report as much as possible. They however still considered developing a shared 'transition language' as one of the aims and saw regular discussions with the management team as a means to realize this. The management team in turn did not see why it should invest and engage in a further discussion until they judged the report as descriptively relevant, goal relevant and instrumentally valid.

Last, the management team did not feel the critique was legitimate. They had not invited transition experts to criticize the programme. The report was critical of the programme goals (CO_2 reduction only, large emphasis on CCS) and set-up (no worked out transition scenario's, little apparent role of innovative players), etc. This was acknowledged by the transition experts early in the process. The transition experts were personally uneasy with the idea of presenting CCS and coal-fired power plants as a sustainable energy solution. They preferred a larger emphasis on renewable energy and energy-saving, although these solutions may not likely be realized before 2025. In addition they would prefer a broader focus on sustainability. The researchers realized that squarely opposing both the goals and set-up of RCI would be unproductive and struggled with the best strategy. In essence the experts evaluated RCI according to their own theoretical and normative standards. These standards were not considered legitimate by the RCI programme.

Different reasons may account for the different evaluation of the monitoring in terms of credibility, salience and legitimacy. The programme manager whose thinking was more in line with transition management and who signed the original proposal left the programme before the results were presented. The tone of the report may have been too critical and better co-production process and general interaction between experts and managers could have led to a better

understanding of the information needs of the programme managers. A more interesting question for transition monitoring is asking what kind of standards would have been appropriate for the programme managers and how this differs from transition monitoring.

One way to interpret this is that programme managers and transition experts wanted a different mode of monitoring. The first monitoring report was a typical example of external reflection, where the researchers developed their own normative framework to monitor the programme. Programme management felt that the key strategic choices had already been made and were not up to debate. Now was the time to act and realize the programme. As one manager (a proponent of a TM approach) expressed it: "*Just when I am ready to mount my horse, grab my weapons and attack the castle, you guys pull me back to ask if I brought enough horses with me*". The managers needed a different mode of monitoring: not an external reflection to open up the debate but a type of monitoring by external experts that monitors the programme purely on its own terms. This mode of monitoring (external to the programme and oriented at closing down) is called testing in the typology of different modes of monitoring presented in chapter 5.

It seems that not only the expectations about the appropriate mode of monitoring differed between the experts and managers but also the expectations of what type of programme is needed to realize the RCI ambition. A starting point is a remark of one member of the management team when the monitoring report was discussed. According to him, the programme was *not* a transition programme, but an environmental programme just like previous programmes to improve air quality. These programmes were very successful and characteristic for environmental policy in the Netherlands in the 1980s and 90s. Grin and De Graaf (2003) describe this type of programmes in a typology of different generations of environmental policy as second generation environmental policy (see table 10.8). Programme managers compared RCI to second generation environmental policy. Indeed, it has many of its characteristics. It had a focus on CO_2 emission sources. The integral chain management paradigm seems applicable, as RCI aimed to optimize existing energy supply chains and industrial chains through for example co-firing biomass in coal plants and capturing and storing the CO_2 emissions. It operated on a term of one generation and aimed to internalize the CO_2 ambition with the existing key players in Rotterdam. Finally, voluntary agreements by key players who are themselves responsible to realize their self-chosen targets played a large role in RCI. Transition management is art of a third generation of environmental policy.

Table 10.8: Three generations of environmental policy in the Netherlands (based on Grin and De Graaf 2003)

	First generation environmental policy	***Second generation environmental policy***	***Third generation environmental policy***
Main policy document	Urgentienota Milieuhygiëne, 1972	Nationaal Milieubeleidsplan 1, 1989	Nationaal Milieubeleidsplan 4, 2002
Policy problem definition	Pollution is a public health problem	1. problem is more persistent than hitherto thought 2. environmental management is a precondition for sustainable development 3. environmental consciousness of societal and economic actors is crucial	1. problem is more persistent than hitherto thought 2. sustainable development requires decoupling of socio-economic development and pollution 3. system innovation needed
paradigm	Caring government	Integral chain management	System innovation and transition
focus	Effects and compartment oriented	Source and region oriented	System oriented
term	10 year	One generations	Two generations
effect mechanism	Regulating behavioural alternatives	internalization	Bringing about interaction between regime and innovative niches
Governance concept	regulation	Self-governance within targets	Shared visions + directed incrementalisms

The description of different generations is reminiscent of the different programme strategies described in chapter 4. Especially the self-governance within targets present in RCI resembles a planning/ result-based management strategy. Such a strategy is based on negotiating a preferably single and clear policy goal (key performance indicator) at an aggregate level and then negotiating increasingly specific sub-goals, leaving the best ways to attain them open to change agents at lower levels. This is much like the 50% reduction target of RCI , translated into 50% reduction targets for harbor, city and mobility and translating the 50% target for the harbor to specific targets for CCS, Biomass and energy efficiency. The appropriate type of monitoring is based on monitoring goal attainment at the different levels. This is quite different from the transition monitoring model but sits comfortably with the final monitoring design for RCI.

In the eyes of the transition experts, RCI implied a transition management approach because of its high level of ambition for CO_2-mitigation (a key sustainability issue), its role as a platform for coordination between different stakeholders and its aim to be a movement rather than an instrument for project implementation. For such a programme a transition monitoring approach as developed in the first iteration is more appropriate.

Such conflicting positions will regularly play a role in transition monitoring. They are part of the game and not necessarily bad. According to Mitroff and Emshoff (1979:p. 10 , in Cuppen 2010): "*the danger is not in reaching compromise, but in reaching it too soon and for the wrong reasons, e.g. because of the inability to tolerate conflict as a sometimes necessary and valuable tool for policy making*". In her review of literature on group decision making processes Cuppen (2010) argues that conflict is only detrimental when it is not perceived as authentic, becomes personal instead of focused on the substance of the issue, or when the different positions are too far away from each other to be manageable. In this case the conflict was detrimental. Positions were too far from each other and the discussions were

quickly framed as a judgment, rather than a shared learning process. This leads to two conclusions on the role of conflict and the limits to the transition management and transition monitoring framework.

The frames of the researchers and RCI management team of the problem at hand and the type of programme needed to solve it were in conflict, but may both be valid in principle. Measuring indicators does not help resolve the controversy over what RCI should be, because different indicators matter, or matter differently, according to different frames. According to Schon and Rein (1994), frame conflicts should be dealt with in the specific situation in which they occur. Strategies for dealing with them are marketing (in this case: adjusting the monitoring design to meet the requirements of RCI), negotiation (trying to find win-win solutions that meet both the requirements of transition experts and the RCI management team), or additional co-design. In the end it seems that the monitoring has not lead to frame reflection by the transition experts or programme managers. Instead the frame conflict was primarily solved by negotiation and adaptation which offered a win-win opportunity -but also definitely a compromise- for both the programme and of the monitoring team.

The result is that the first iteration showed all of the characteristics of the transition monitoring approach developed in this study (see chapter 4), while the third iteration showed few. For example, the first iteration emphasized the importance of on-going discussions between managers and experts. The third iteration is based on routine data collection by the Rotterdam area environmental agency on indicators designed by transition experts and the agency and discussed separately by the management team. The first iteration suggested interrelated indicators on all levels and also monitoring the development of transition scenarios inside and outside RCI, while the third iteration only included change and sustainability indicators in the transition field. These indicators were related to the RCI programme and projects, but only indirectly. The first iteration assumed that indicators were flexible and to be further discussed and adapted throughout the programme, the third iteration is based on fixed indicators, although provisions were made that sub-indicators like the number of sustainable houses could be refined as the transition process unfolded.

Table 10.9 The first and third iteration in monitoring the RCI compared to the characteristics of transition monitoring

Characteristics of transition monitoring	*First iteration*	*Third iteration*
TMon uses concepts and theories of transition studies appropriate for the programme to be monitored	Yes	No
TMon accommodates visionary and transformative strategies	Yes	No (planning strategy)
TMon requires monitoring on different levels	Yes	No (transition field only)
TMon requires monitoring in different dimensions	Yes	Partly (development of transition scenarios no longer monitored)
TMon takes place in a process of co-production to which different modes apply	Yes	No
TMon is a flexible monitoring approach	Yes	No

10.8 CONCLUDING REMARKS

Transition experts, the environmental agency of the Rotterdam area and the Rotterdam Climate Initiative attempted to develop and implement transition monitoring. In a first report the programme, the actor field in Rotterdam and the regional energy system were described from a transition (management) perspective using the transition monitoring approach. This report resulted in a set of more specific indicators and relevant questions for the RCI to reflect on. However, the programme criticized the credibility, salience and legitimacy of the monitoring so far. The resulting conflict had different causes. Some of these were context-specific like a change in management and the critical tone of the report. Others seem to have more generic implications for transition monitoring. First, programme management and transition experts had different ideas about the mode of monitoring required. Second, the programme did not see itself as a transition programme and largely followed a planning instead of a visionary strategy. As a consequence the programme did not see transition monitoring as a tool to regularly reflect on its goals and on its set-up. Over time, the programme suggested revisions and the final iteration of the monitoring design showed little characteristics of the transition monitoring approach.

This case clearly shows that transition monitoring is not an approach for all programmes. Programmes that are based on a planning strategy and do not explicitly seek system change will have less use for monitoring transition scenarios and sustainability definitions, using monitoring for opening up and constantly exploring the relation between dynamics at project, programme and transition field level. This is not a judgement of the merits of the programme and other monitoring approaches (the final set of indicators offers relevant insight in the desired transition in the Rotterdam energy system and is much better attuned to the programme), only a reminder that the appropriate type of monitoring depends on the type of programme you are dealing with. The lessons of this case may be summarized as follows:

- **The TMon approach was not appropriate for the planning strategy of RCI**. Although initial programme management of the RCI seemed to propose a visionary strategy, the later programme management by and large followed planning strategy based on results based planning. Programme management was especially

interested in monitoring goal attainment and less interested in monitoring the governance process, lessons learned in the programme and the interaction between dynamics in the transition field, programme and projects (with the exception of whether the targets were met).

- **Conflicting modes of monitoring desired by transition experts and programme managers lead to rejection of the first monitoring report**. Transition experts wanted to provide external reflection based on transition management ideas, while programme management wanted an external audit of its goal attainment (most closely related to the mode of testing in the TMon approach). This and the previous point, lead to conflicts. These conflicts were addressed over the years by marketing and renegotiating the monitoring design until this was aligned with the programme's monitoring needs, but hardly featured any characteristics of the TMon approach
- **Disagreement about whether TMon was appropriate and more specifically about the needed mode of monitoring and use of transition management theory, lead to different assessments of the credibility, salience and legitimacy of monitoring**. The critique of RCI programme managers on the first report involved the credibility, salience and legitimacy of the monitoring activities. Experts and managers disagreed on the terms on which credibility, salience and legitimacy should be evaluated.

CHAPTER 11 CONCLUDING REMARKS AND DISCUSSION

This chapter consists of three sections, roughly following the basic questions of any evaluation: 'What, So What and Now What?' Section 11.1 answers the research questions presented in chapter 1. Section 11.2 discusses the findings. First, it presents a final revised transition monitoring approach for programmes that start with transition experiments rather than a worked out transition scenario. Secondly it discusses how the view of programming as problem structuring may also inform ex post evaluation. Thirdly, it reflects on Mode 2 science through the lenses of different modes of monitoring. Section 11.3 presents the lessons on transition management, offers recommendations for people who initiate, manage or monitor transition programmes and suggests areas for further research.

11.1 CONCLUSIONS

This research aimed to design a monitoring approach that is useful for programme managers that want to contribute to a sustainability transition. First a short recap of the starting points for transition monitoring (TMon). The introductory chapter started with a paradox. On the one hand, transition dynamics and the effects of interventions to influence them are difficult to predict and therefore monitor. On the other hand, influencing transition dynamics depends on a process of intervention, learning and modification based on information on real-time change processes, in other words some form of monitoring.

As with many paradoxes, a way out can be found by reframing this original starting point. This dissertation does not ask whether programmes *realize* anticipated goals with their chosen means –the question that most monitoring and evaluation (M&E) approaches address-, but whether programmes *create* goals and means to further a sustainability transition. Goals become apparent through the development of a network of change agents that champions a certain transition scenario. The means are the portfolio of projects, a network and other political, financial and technological, resources that the change agents can muster to realize this transition scenario.

FIRST RESEARCH QUESTION: KEY CHALLENGES IN THE DESIGN OF TRANSITION MONITORING

A preliminary monitoring approach was piloted to identify key challenges for transition monitoring. Five monitoring pilots were conducted (Chapter 3). The preliminary monitoring approach consisted of (1) monitoring three levels (transition level, programme level and project level), (2) monitoring three dimensions (the change process, transition scenarios and sustainability) and (3) co-production of the monitoring by transition experts and programme managers. The involved programme managers and experts confirmed the importance of co-production and monitoring the levels and dimensions, although it was difficult to focus on all levels and dimensions simultaneously.

Still, the pilots had mixed results. Some pilots were considered successful, while others failed. To better understand *why* the results differed, the interplay between monitoring activities and programme context was analysed in more detail with a realist meta-evaluation. This resulted in five key challenges. These are:

1. **Relating developments at different levels and dimensions**. Programme managers wanted steering suggestions that combined insights from different levels and dimensions. As monitoring all levels and dimensions all the time is neither feasible nor desirable, heuristics are needed which developments are salient at different points in time.
2. **Dealing with different programme strategies**. Monitoring activities need to be aligned to the programme strategy. The pilots showed that there are different programmes strategies. A key difference is that some programmes start out with a transition scenario, while others develop such a scenario only in the course of programming. Especially for programmes that start without a transition scenario, monitoring was challenging. For example: conflicts arose about whether the strongly scenario-based transition management framework was appropriate as a basis for monitoring.
3. **Adapting to changing monitoring needs**. As programmes develop, programme management priorities change and hence the information requirements. To provide the right monitoring information at the right time it is needed to anticipate programme management priorities and to have a flexible monitoring approach that can adapt to changing priorities.
4. **Accommodating different views of co-production**. The pilots confirmed the importance of co-production: the more co-production, the higher the results were valued. At the same time Q analysis and interviews revealed that programme managers in practice had different expectations of what co-production means and this led to conflicts. The concept of co-production therefore needs to be unpacked in order to guide the cooperation between transition experts and programme managers.
5. **Evaluating the programme fit.** The previous challenges emphasize the importance of a good fit between TMon activities and the programme. Criteria are needed to evaluate this fit.

SECOND RESEARCH QUESTION: TRANSLATION INTO A MONITORING APPROACH

The five key challenges form the basis for the TMon approach which consists of a monitoring framework, a monitoring process, an understanding of programme dynamics and different modes of co-production. The emphasis on co-production and the different levels and dimensions of the preliminary monitoring framework were maintained. The approach addresses the five previous challenges as follows:

Relating developments at different levels and dimensions

Two elemental programme management heuristics were developed for the general monitoring framework (see figure 11.1). The first general programme management heuristic concerns the relation between the dimensions transition scenario, sustainability criteria and change: programme managers should realize changes in practices, culture and structure in the direction of a transition scenario that is sustainable. The second heuristic concerns the relation between the transition field, programme and projects. A programme links projects to the transition field and should align the levels in such a way that individual projects activities form a coherent and diverse portfolio that is relevant to –and influences- the transition field.

Transition theories work as a model that help define and links indicators and develop steering suggestions. Section 4.1 offers an overview of transition theories and the levels and dimensions they refer to. To develop a heuristic which information is salient at which point in time requires understanding programme strategies and phases.

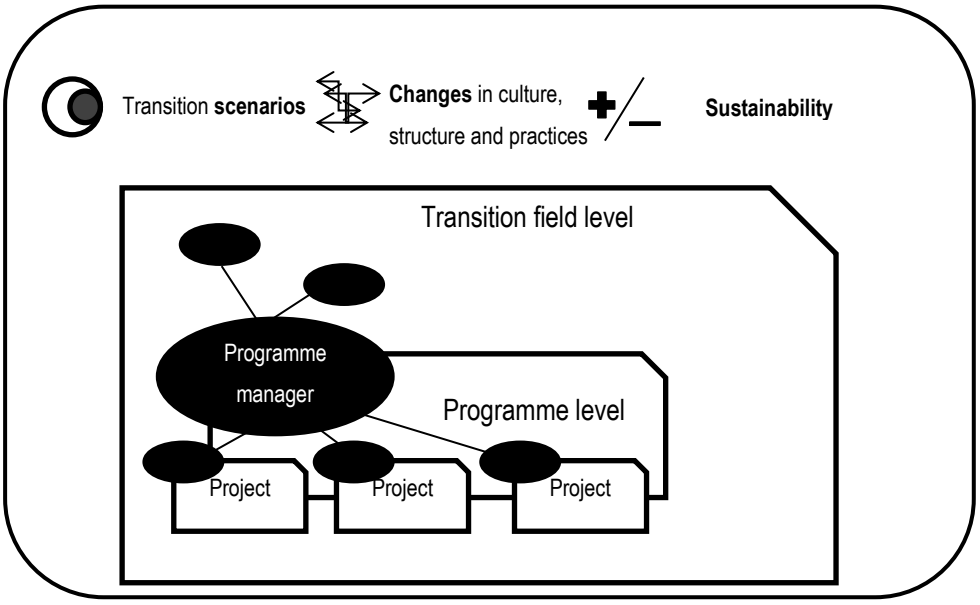

Figure 11.1 The transition monitoring framework

Dealing with different programme strategies

The pilots showed that programmes have different strategies. Based on a typology of entrepreneurial strategies (see section 4.2), there are two archetypical transition strategies: visionary and transformative. The main difference (as highlighted in the pilots) is whether a programme starts out with a transition scenario or with local transition experiments. A visionary programme starts from a vision of what a valuable future would be and then tries to shape the environment in order to realize it. The vision is actively used to influence other actors in the transition field. The programme develops new standards and different alternatives are tested in practice to quickly learn about ways to realize the vision. Over time learning about the programmes activities and changes in the transition field may lead to revisions in the vision. A transformative programme starts with experiments to explore persistent barriers and potentially promising long term changes. Based on these initial projects the programme builds the identity, knowledge and networks to take a next step, which requires commitment of new stakeholders. Through every step more knowledge is gained, networks are created and tightened and a stronger sense of identity is constructed. This provides increasing means and, as more commitments are made, converging goals reflected in a shared transition scenario.

Programmes experience similar phases, although the actual activities differ between strategies. The phases result from the typical way most programmes in this research were set up: with one-off funding and for a fixed period. Programmes develop through a cycle with four phases: (1) formulation, (2) organization, (3) deployment and (4) appraisal, after which the programme again re-enters an organization phase or prepares for dissolution.

The two programme strategies and programme phases help to anticipate and discuss monitoring needs. Because programme management priorities (and therefore monitoring needs) change in different phases, monitoring activities need to be adjusted accordingly.

Adapting to changing monitoring needs

Periodical adjustment of the monitoring as a result of on-going learning and changing programme phases requires a cyclical monitoring process (see figure 11.2). The monitoring process starts with a general programme description which describes the scenarios, changes and sustainability effects of current programme, projects and the transition field. In the second step external experts and programme managers decide on areas for additional monitoring efforts. Which information requires additional time, money and effort by means of systematic transition monitoring is partly context-dependent. Also without monitoring, programme managers have information on developments through informal discussions, media and other monitoring and evaluation activities. After observing the developments in practice, the results are reflected upon in light of the programme as a whole and lead to steering suggestions and (over time) a revised programme description.

This cyclical process offers a systematic account of programme development through regularly updated programme descriptions, allows time to design, implement and analyse monitoring activities, and to periodically discuss where monitoring efforts need to be adjusted to be most valuable for programme management.

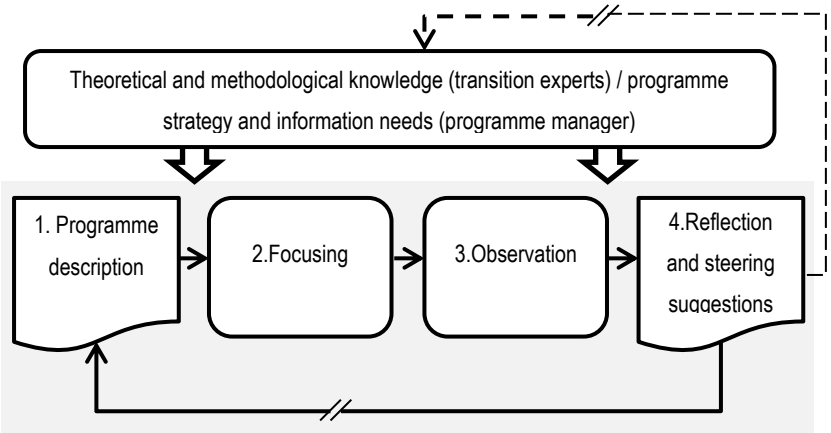

Figure 11.2 Monitoring process

Accommodating different views of co-production

A typology of modes of monitoring was developed based on the different views of co-production identified in chapter 3, the distinction between two types of appraisal (closing down and opening up) and a typology of science-policy interaction (see figure 11.3).

The vertical axis distinguishes between opening up or closing down. Monitoring stimulates a process of closing down when it makes a single framing of the situation measurable with indicators, cutting through the prevalent ambiguity and divergent possible framings. Closing-down reduces complexity, focuses resources and attention, and facilitates action. In contrast, opening up stimulates broader reflection and systematically identifies new ways of thinking about the programme, projects and transition. Both types of appraisal can take place in co-production, but in practice either transition experts or programme stakeholders will take the lead. This forms the horizontal axis.

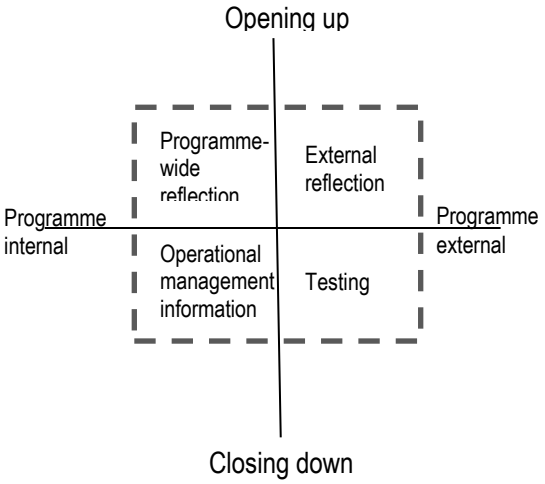

Figure 11.3: typology of modes of transition monitoring

In programme-wide reflection (top left), transition monitoring is an instrument for reflection by diverse programme stakeholders supported by experts. External reflection is also aimed at opening up, but here external experts monitor the programme from their own (theoretical) perspective which they continuously discuss with programme managers. In testing, experts are also in the lead but primarily check claims and promises of programme management, which results in closing down on the existing ideas within the programme. For operational management information the aim is to make transition monitoring as much part of day to day programme management as possible. Monitoring experts support programme managers to generate information flows for daily or regular management decisions.

The modes of monitoring help managers and external experts think about and discuss their expectations and respective roles. This helps streamline the monitoring process and prevents conflicts later on.

.**Evaluating the programme fit**

Three criteria were formulated to evaluate the alignment of a monitoring application to the user needs (see section 4.5). Credibility is the scientific adequacy of the technical evidence and arguments produced. Salience is the relevance to the needs of programme managers. Legitimacy refers to the perception that the knowledge production is respectful of stakeholders' divergent values and beliefs, unbiased, and fair in its treatment of opposing views and interests.

THIRD RESEARCH QUESTION: LESSONS FROM APPLYING THE MONITORING APPROACH

The monitoring approach presented so far describes a range of design choices a monitoring team faces: which areas to focus on, which type of strategy and phase are at stake, which roles managers and experts play respectively, etc. An additional five cases (chapters 6-10) were selected to apply this monitoring approach and learn how transition monitoring works with respect to (a) multi-level monitoring, (b) application to different programme strategies, (c) regular redesign of monitoring activities and (d) different modes of monitoring (research question 3).

The case studies were conducted within programmes with a different strategy, in different modes of monitoring, they focused on different levels and were to various degrees redesigned. This is summarized in table 11.1. This table also shows the sectors in which the programmes operated and the main transition theories used in the monitoring activities. For the specific monitoring activities and case-specific lessons the reader is referred to the respective case chapters.

Table 11.1 Overview of case studies (chapters 6-10)

	TPLZ	TransForum	New Gas	IAE	RCI
Chapter	6	7	8	9	10
Sector	Health care	Agriculture	Gas sector	Energy	Energy
Transition theory used	Deepening, broadening and scaling-up	Transition management (limited)	Transition patterns and transition management	Innovation systems analysis	Transition management
Multi-level monitoring	Focus on project-programme interaction	All levels	Focus on programme-transition field interaction	All levels	Focus on programme-transition field interaction
Strategy	Transformative	Transformative	Visionary	Visionary	Planning
Monitoring redesign*	Failed redesign	Successful redesign	NA	A flexible design proposed	NA
Modes of monitoring	Programme wide reflection	External reflection	External reflection	NA	External reflection

**This can only be investigated in cases where monitoring is implemented for several years. Monitoring New Gas was a one off activity, monitoring the IAE consisted of a design only that was not fully implemented at the time of writing. Monitoring redesign took place twice in the RCI, but this was less of a result of earlier monitoring findings and developments than of the initial mismatch between the TMon approach and the monitoring needs of RCI.*

Although care should be paid to generalize findings from these cases, each with their context-specific monitoring applications, different theories of change, different monitoring methods and different experts and managers, a number of conclusions can be drawn.

Transition theories are useful as long as they are already used in the programme

One of the assumptions was that transition theories are useful for monitoring transition programmes. Four different theories were used. The transition management model as described by Loorbach (2007, chapters 7,8,10), Innovation Systems Analysis as developed by Hekkert, Suurs et al (2007, chapter 9), transition dynamics according to the theory of De Haan (2010, chapter 8) and the theory on the development of transition experiments through deepening, broadening and scaling-up developed by Van den Bosch (2010, chapter 6). Transition monitoring based on these theories-of-change led to salient and legitimate results when the theories were used in the programme outside the monitoring activities too. The use of deepening, broadening and scaling-up in the transition programme on long-term healthcare (chapter 6), the innovation systems analysis in the Innovation Agenda Energy (chapter 9) and transition management in the platform New Gas (chapter 8), and (partly) the theory on transition dynamics for platform New Gas (chapter 8)[43] resulted in monitoring that was considered salient and legitimate. This was not the case with using transition management in the

[43] Although it should be considered that most platform members were not involved in the monitoring design and the theory was therefore new to them when it was discussed. This transition theory was only used in one of the four reflective questions raised, and this question did spark a discussion on the gas regime although not with explicit referral to the conditions and patterns described in the monitoring.

programmes on sustainable agriculture (TransForum, chapters 2 and 6)[44] and the Rotterdam Climate Initiative (chapter 10). These programmes did not make use of transition management theory and –consequently-felt they were monitored against an inappropriate yardstick.

There are two reasons why the transition theory used must match the theories used in a programme: the normative implications of transition theories and the high level of detail needed for credible monitoring. When theories of change are used for monitoring to improve programmes, they have normative implications. For example using transition management as a basis for monitoring implies that arenas and integrated, long term transition visions are important elements of a programme. Innovation systems analysis (ISA) implies that programmes need to be willing and capable to affect all innovation functions that form the basis of an ISA and so on. When these normative implications are not shared by programme managers, the resulting recommendations lose their salience and legitimacy. Second, monitoring requires going beyond general discussions. Considerable shared understanding in the monitoring team is needed to define operational indicators that correctly reflect relevant variables and result in relevant recommendations. Introducing new theories to a programme (which was sometimes a goal for the involved transition experts), leads to a more general discussion with programme management and draws attention away from the more detailed discussion on indicators needed for monitoring.

Transformative and visionary programmes develop differently and should be monitored accordingly.

The distinction between visionary and transformative strategies and the programme phases presented in chapter 3 was useful. RCI (chapter 10) had a different strategy: a planning strategy. In this programme transition monitoring failed as would be expected. The programmes TransForum and TPLZ (chapters 6 and 7) followed a transformative strategy and developed accordingly. They started with transition experiments, learned from them about structural barriers for system change and a desirable transition scenario, initiated additional tactical and strategic activities to address these issues and became more pro-active in engaging with the projects, facilitating programme level learning and advocating change in the sector at large. Transition monitoring was more successful when it supported this strategy.

One mismatch with the theorized transformative strategy was identified. The idea of a transformative strategy was based on literature on entrepreneurship. In successful innovative companies the resources grow over time. This is not the case in the programmes when it comes to human and financial resources. The conventional way to set up programmes is to give them a fixed budget for a set period. This means that these resources become depleted over time regardless of the success of programmes and their projects.

Less was learned on the use of TMon for visionary programmes. The monitoring in the visionary platform New Gas was a one-off activity and the implementation of the monitoring design for the IA falls outside the scope of this dissertation. But in general, experiences confirm the characteristics of a visionary strategy. These include the active external use of a transition scenario to influence the transition field, its internal use to formulate goals for tactical and operational activities and the refinement of scenarios based on lessons from these activities and developments in the larger transition field.

[44] Some elements of transition management that were not controversial for TransForum were used in the later monitoring activities which *were* considered salient and legitimate.

Transformative and visionary strategies result in different monitoring needs. In both the visionary platform New Gas and the transformative TransForum, monitoring transition scenarios in the transition field was useful. However, New Gas actively marketed its scenarios to influence the sector and advocate particular changes in the gas system. In contrast, TransForum used the monitoring primarily to develop its own scenario, which it viewed initially more as having an internal goal to structure the project portfolio. In the cases of TPLZ and IA, the progress of operational projects was monitored. The transformative TPLZ monitored projects with regard to their individual process of deepening, broadening and scaling up. In contrast, the visionary programmes of the Innovation Agenda Energy are to monitor project progress with respect to transition field phenomena: the identified weak functions in the innovation system. This also means it becomes more easy to monitor synergies at programme level and their effect on the transition field.

Not just the purpose and types of indicators differed, but also the timing. For the visionary programmes, monitoring transition dynamics was relevant from the start of the programme development cycle. Both because of their more immediate external focus and to identify projects relevant to the larger transition dynamics. Managers in the transformative programmes on the other hand were initially more interested in project level monitoring.

Different modes of monitoring needed at different points in time.

The typology of different modes of monitoring (chapter 5) helped monitoring design. It is a good basis to discuss and agree on the function and roles of experts and programme managers in transition monitoring. Conflicting views on the appropriate mode of monitoring within the monitoring team leads to conflicts. This was the case with RCI (chapter 10) where transition monitoring failed partly because of this and led to a negative evaluation of the credibility, salience and legitimacy of the monitoring activities.

In TPLZ the monitoring need shifted from opening up to closing down, implying that different modes of monitoring are needed over time. The case of TransForum in which the mode of monitoring changed from external reflection to management information showed that this can be done successfully. Towards the end of the programme, modes that internalize and close down the appraisal of developments are needed.

Redesign means flexibility within a stable framework

When the TMon approach was presented in chapter 5, it was argued that monitoring should be flexible in order to adapt to changing programme development issues. The experience with successful redesign is limited to the application of monitoring in TransForum (chapter 7) and its design for the Innovation Agenda Energy (chapter 9). Both cases suggest that flexibility can be maintained without fundamentally changing the general monitoring design of a programme. It is not desirable to design the monitoring from scratch in each monitoring cycle. Keeping the general characteristics of the monitoring design (like the theoretical perspective and aggregated indicators) the same, is likely to make redesign more acceptable and faster and provides continuity to the monitoring process and information. In the case of redesign in TPLZ (chapter 6), more fundamental changes were attempted. However, this required additional resources and the changes were therefore rejected.

The monitoring approach can and should be further specified

The main challenge identified in the pilots (chapter 3) was to fit the monitoring to the programme strategy and dynamics. Therefore the pilots especially showed the need for a versatile monitoring design to accommodate different strategies,

views of co-production, etc. The next step was to develop different typologies to make distinctions between strategies, views of co-production, etc. These typologies improved the second group of monitoring cases. The lessons from these cases included the benefits of a stable framework for monitoring redesign, similarities in programme development and similarities in aggregated indicators. The cases suggest that particular levels, monitoring dimensions and modes of monitoring may be particularly salient at different points in time. It provides an opportunity to develop a more specific design of TMon for particular strategies. In the next section discussion such a revised monitoring approach is presented for transformative programmes[45].

11.2 DISCUSSION

This section starts with a redesign of the monitoring approach for transformative programmes. Then it argues that co-production should not be approached as a 'perfect blend' of research and practice but rather as more interactive versions of existing research traditions. This makes co-production more transparent and makes it possible to adhere to existing scientific standards as well as extended peer review. The discussion then goes on to describe that although the TMon approach was designed for programme development, its insights may also be used for ex post evaluation of transition programmes.

TRANSITION MONITORING FOR TRANSFORMATIVE PROGRAMMES

A transformative strategy is expected to lead to a particular pattern of programme development. With this pattern as a basis, the monitoring approach can be refined. This redesign is based on the lessons in monitoring the transformative programmes TPLZ and TransForum (chapters 6 and 7). This new version of the TMon approach offers more guidance to monitoring experts and programme managers[46]. It describes what type of monitoring is likely to work for transformative programmes and when.

The approach is described in figure 11.4. This figure describes the programme phases (the white inner circle) and corresponding monitoring activities (the grey boxes). Before entering the first organization phase the programme is formulated by means of a rough description of goals and transition field and tentative experiments. Each next programme phase has its own monitoring cycle and results in a new programme description. In the organization and first half of the deployment phase, monitoring focuses on opening-up. In the second half of the deployment phase, monitoring stimulates closing down.

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[45] *In hindsight, this is surprising. At the start of this research it was expected that more concrete and useful transition monitoring would result from more strict application of a particular transition theory. The cases however showed that the relevance of these theories for hands-on programme development was contextual. Transition theories were only useful for hands on programme development to the extent they were already being used in the programme.*

[46] *As mentioned, the visionary cases do not provide enough lessons to provide an empirically validated final redesign for visionary programmes. The monitoring format designed for the innovation agenda may (chapter 9) may serve as an educated guess and reference point for a more explicit visionary monitoring approach.*

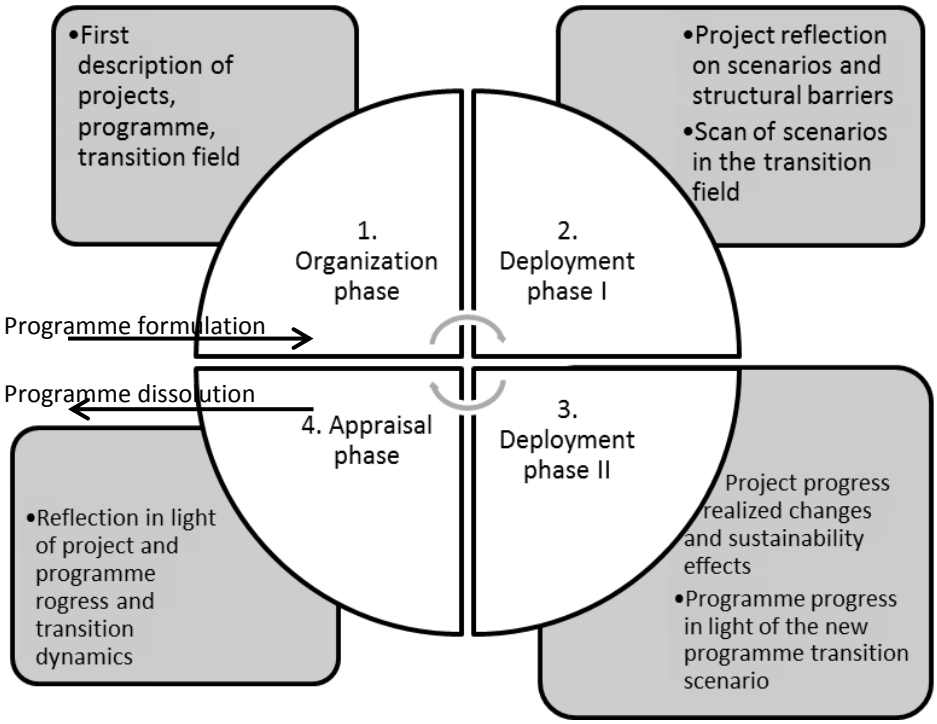

Figure 11.4 Transition monitoring for transformative programmes (white inner circle shows programme management activities and the grey boxes show the monitoring activities)

1. *Monitoring in the organization phase:* First description of projects, programme and transition field

In the organization phase, experiment are selected and initiated and programme management is staffed. Monitoring is used to create a first programme description and to design the monitoring for the next phases. Programme management is involved in this design and experiments are informed how they will be monitored and why this monitoring benefits them. The transition field, programme and projects are described. This description serves as a reference point for on-going programme development. A transformative programme starts with a portfolio of transition experiments. The first project description will therefore be more concrete than that of the programme and transition field levels. Experiments are described with respect to their innovative features, the sustainability issues they address and initial transition scenarios. These shorter term scenarios should include the transition changes that an experiments expects to realize in the next 3-5 years within its local context. The broader the scope of the portfolio of experiments, the broader the scope of potential transitions that can be explored. The smaller the scope, the easier it may be to exploit synergies and address shared tactical and strategic issues later on.

2. *Monitoring in the deployment phase I:* reflection on project scenarios and scan of the transition field.

In the second programme management phase, the first experiments are initiated and monitoring is primarily used for project support by the programme. In this phase monitoring is geared towards opening up. More specifically, two monitoring activities are executed. Firstly, programme-wide reflection on projects. Programme-wide reflection means that project leaders and programme managers together identify key developments, facilitated by transition experts. The aim is both to strengthen the individual projects and to explore common barriers and elements of a transition scenario. Programme-wide reflection helps create trust, learning and a shared sense of purpose between projects and the

programme. The resulting project-level commitment to the programme is necessary for the next phase. Content-wise, the monitoring clarifies the diversity of scenarios, changes and sustainability issues in these projects. For the project leaders this helps to position their experiment with respect to the larger transition process.

Secondly, external reflection takes place through a scan of transition scenarios in the transition field. Although the projects will be the main source of information and prime focus for programme management, external reflection offers an additional source of information for the emerging transition scenario of the programme. The main question is which transitions are being pursued in the transition field and how an emerging programme-level transition scenario can improve, use, or contest these transition scenarios in order to strengthen the programme's transition scenario.

The results of both monitoring activities will be added to the programme description at the end of this phase. The programme uses the monitoring to draw lessons about a desirable long term transition and structural barriers and opportunities in the transition field that should be addressed. These set the agenda for selecting additional experiments and new strategic and tactical programme activities and projects.

3. *Monitoring in deployment phase II: Assessing project and programme progress*

In the third phase, the first experiments will be at full speed and new tactical and strategic projects are initiated. based on the emerging programme level transition scenario. Additional experiments may be added to the portfolio to address new opportunities, replicate initial successes or fill in white spots. By the end of this phase, the first projects will end, and a programme level transition scenario will be largely formulated.

In contrast to monitoring in the first phases of programme management, monitoring is now geared towards closing down as projects will need to demonstrate their sustainability advantage and ability to continue without support from the programme. Monitoring takes place at the level of projects and the programme as a whole. The project progress reports close down as the transition scenarios of the projects have become more stable and focuses on the outputs and outcomes of the project in terms of realized changes and sustainability effects. This monitoring should answer the questions: What are the changes and sustainability effects realized by the project? How does the project contribute to the programme and transition as a whole?

Monitoring on the programme level is informed by the project progress reports. The aim of this monitoring activity is to assess the programme's progress as a whole in light of the new programme's transition scenario. The report focuses on the synergies of projects and their relevance to the emerging transition scenario. It aggregates the results of the individual projects and focuses on common themes which are the responsibility of programme management. If projects do not have enough progress or are no longer relevant in light of the emerging transition scenario, the programme may modify them or remove them from the portfolio.

4. *Monitoring in the appraisal phase:* taking stock of accomplishments and new challenges

In the fourth phase the programme takes stock of its results and lessons, based on the increasingly clear transition scenario, the outcomes of the first experiments and outputs of newer experiments, strategic and tactical activities. The appraisal either leads to a new programme cycle based on a revised programme description, or to programme dissolution. In a new cycle the programme is likely to have clearer challenges and ambitions as goals and means have

been clarified as a result of previous programme development. When this is the case, other monitoring approaches like performance measurement and logframe-based planning and monitoring may become more appropriate.

Monitoring can contribute to this phase by taking stock of the increased focus of the programme in a discussion between programme stakeholders. This discussion is informed by the latest programme description and all (updated) the previous monitoring activities. The contribution of the programme to the current, larger transition dynamics may be identified with reference to the identified barriers and scenarios. The main question is: what has been the relevance of the programme for the desired sustainability transition so far and which lessons are learned? And, based on the earlier questions, how should the programme be adjusted? The participants in this discussion are not likely to fully agree on the answers, at least initially. This requires an initial round of opening up to clarify the different underlying arguments and issues. In the end however, the participants need to close down on an up-to-date and shared understanding of the progress, effect and necessary adjustments to the programme.

After several programme cycles, the programme is ended. Programme dissolution can be useful for a range of reasons. For example when (1) the programme has been successful and is no longer necessary as other actors and institutions (state, market, networks, lobby groups etc.) can take over its task (2) when the costs outweigh the benefits that the programme realizes, (3) when the environment has changed, making the purpose of the programme no longer relevant or (4) when the results of the first cycle show that the programme's proposed transition cannot be realized. Ex post evaluation of the outcomes of the programme after several years may be used to establish the effects of the programme.

SCIENTIFIC STANDARDS FOR CO-PRODUCTION

Transition monitoring has to deal with normative elements. It requires defining what sustainability is, which transitions are necessary and what constitutes progress in this direction. The indicators have structural power as they define what kind of actors and activities need to be supported and to what cause. As a result, monitoring requires co-production by researchers and policy makers (in this case programme managers) because of the uncertainties and stakes involved (Funtowicz and Ravetz 1993).

It also means that monitoring should be transparent as to who defines indicators and to what effect. Although co-production and related modes of research such as Mode 2 science are often argued for, it is a topic of on-going debate how the quality of such research can best be assessed (Hessels and van Lente 2008). When programme managers and transition experts continuously negotiate what to monitor and what not, external experts become stakeholders in the programme. This may obscure how conclusions and definitions are reached. Shove and Walker (2007) specifically point to the politics and mechanisms in this process. Transparency is a critical issue to assess the quality of transition monitoring and that of transition programmes.

Even though it is not a definitive answer, this research suggests to stay away from 'ultimate' co-production in which the choices and roles of experts and managers become fully intertwined, but retain some level of primacy for either party and explain whether opening up or closing down is aimed for and offer explanation how this is achieved. By deliberately choosing to operate from a particular mode of monitoring, standards can be identified to ensure the quality of the monitoring. The modes of monitoring presented in chapter 3 unpack the concept of co-production. Each mode can be thought of as a more co-productive version of typical monitoring and evaluation activities for which transparency criteria are more clear. Consider for example the co-production mode 'testing'. In this mode, experts are responsible for the

methodological framework and analysis only and programme management provides the theory of change and goals. This mode is a more co-productive version of accountancy or 1st generation evaluation (see Guba and Lincoln, 1989) and can be judged through the appropriate standards for accountancy and 1st generation evaluation. In programme wide reflection (more resembling diversity oriented participatory M&E methods like 4th generation evaluation), quality criteria include transparency on the process through which the diversity of interpretations by stakeholders is made explicit and discussed and on which topics different viewpoints remain. This way, co-production is not a knowledge arena in which 'everything goes' but one where traditional criteria still apply.

EX POST EVALUATION OF TRANSITION PROGRAMMES

Judging the effect of transition programmes is highly challenging. Government institutions and advisory bodies have frequently criticized the lack of evaluation of innovation and transition programmes and advised to develop SMART criteria to do so (Algemene Rekenkamer, 2011; Commissie van Wijzen, 2011). Others have pointed to the complexity and uncertainties associated with sustainable development and transitions making it difficult to develop SMART goals ex ante. In addition, they point to the complexity and scale of the transitional changes that programmes are expected to influence, making it difficult to attribute effects to a programme intervention (i.e. Regeer et al. 2009).

Although transition monitoring was designed for programme development purposes (which is quite different from accountability), the lessons learned and the starting point of programming as problem structuring do suggest possibilities for programme accountability. Transition programmes are not needed in situations where the appropriate goals and means are known (in which case civil society, markets and politics are the prime arenas to assess their viability and decide to pursue or abandon a proposed transition). They start instead from a state of not-knowing (see for example Duret and Martin, 1999). Creating appropriate goals and means becomes the main task of transition programmes and the task to which they should be held accountable. They may be evaluated with respect to the extent to which they create goals and means that increase the diversity of real, sustainable and innovative options available to society. This does not mean that the value of programmes lies in intangible learning processes alone: the idea is that they have to *create* the means (including the networks and technological options) and goals. Only through realizing real changes, real learning can take place.

The starting point is that transition programmes are initiated because sustainability problems present an unstructured problem for society at large: which sustainability transition to pursue and how to pursue it. All programmes in which transition monitoring was carried out learned to structure this problem over time. They developed and revised long-term transition scenarios. They identified structural and cultural barriers to systems change and initiated activities to address these. They set up transition experiments that were to various degrees successful and they coordinated all these different activities. In doing so, these programmes created new networks and became active change agents in pursuit of particular transitions. These programmes have to various extents contributed to problem structuring by increasing the range of sustainable and innovative options available to society. Other evaluation research on the same programmes discussed in this research confirm this (ie Bressers (2011) on Leven met Water and Transumo, Regeer (2010) on TransForum).

A successful programme can be expected to present a clear and well validated argument what type of transition is desirable and how it could be pursued. It will be able to demonstrate innovations that have increasingly better sustainability effects, to name key structural and cultural barriers as well as effective ways to deal with these, to define an increasingly clear transition scenario for the long term and –more importantly – an advocacy network of well-connected actors that develop this transition and the growing amount of time, financial, organizational and other resources they muster to do so. This argument can be used to develop a general evaluation framework for transition programmes.

Three remarks need to be made. First about the consensus on the desired transition. As can be seen in the cases presented, the sustainability claims and desired transitional changes will always be contested. The arguments presented above by no means intend to imply that a successful transition programme will propose a transition that everyone will agree on. The goals and means do not have to be considered appropriate by society as a whole but by the network or advocacy coalition created by the programme. This advocacy coalition consists of actors 'that share a set of normative and causal beliefs and who will often act in concert' (Sabatier, 1987). This advocacy coalition may play a stronger role in the political and business arenas than before and contest other coalitions, for example those in favour of the status quo or other transitions. Second, about the inherent uncertainties in a transition. A successful programme will never solve all the uncertainties and the 'transition challenge' will never become fully structured. However, a successful programme *will* reduce some uncertainties, for example about the feasibility of particular innovations, the actors that may support a particular change and its sustainability implications. Third, the degree to which such a general framework can be made operational. Of course this partly depends on the programme in question, the interests of the actors a programme is accountable to and the particular expertise of the evaluator. Although some criteria will be difficult to turn into indicators, the cases in this research provide various examples how this may be done.

11.3 LESSONS AND RECOMMENDATIONS

After answering the research questions and exploring their implications, this section is about the 'now what'. It presents lessons about transition management through programmes and more specific recommendations to people initiating, managing or monitoring transition programmes.

TRANSITION MANAGEMENT THROUGH PROGRAMMES

In this research, transition programmes are approached as an instrument to structure a transition challenge and create a transition alternative (which is essentially the same). Such programmes are especially thought useful during the predevelopment phase of a transition. This is a phase when there is a lack of alternatives. In other phases programmes may have a different function.

The conditions in which a transition programme can be successful have to be created. The institutional set-up of programmes strongly influences the speed and direction of programme development. Beneficial conditions in the cases include some form of periodic accountability like mid-term reviews. These motivate programme managers to fundamentally take stock of accomplishments, compare these to earlier expectations and adjust strategies. Other conditions limit the development of transition programmes. The practice of determining the end of a programme beforehand and providing the full budget at the start of the programme is a good example. Both result in an inclination to

spend the majority of the budget before the programme is able to identify the type of projects and actors that are most promising. By the time the programme knows better, it operates with a only a short horizon left and on limited means. This was a recurring problem in many of the programmes monitored.

Transition management should recognize and pay more attention to the different strategies that programmes employ. The strongly vision-based approach to transition management that starts with a strategic arena of frontrunners that continues to play a central role is not the only strategy. Many programmes start with operational transition experiments and only later engage in more tactical and strategic activities. Next to this bottom-up transition management (Van den Bosch, 2010) or transformative strategy there is a third type of strategy too that starts from tactical activities (creating a network and an agenda) and work towards operational and strategic activities from there. Although no programme with such a strategy was present, there are different examples of these types of programmes in the Netherlands currently like Urgenda and the so-called green deals.

Within the programmes monitored there are different good practices that may be used in other programmes as well. For example the way TPLZ selected transition experiments based on their innovativeness and stimulated multiplication/ broadening and scaling up from the outset, or the way platform New Gas tried to shape and adapt to different transition scenarios in the transition field.

RECOMMENDATIONS FOR PROGRAMME INITIATORS AND MANAGERS

Be more than a donor

Programme initiators are often powerful actors with vested interests in existing regimes. They have the power to inhibit or propel transition dynamics. Initiating a transition programme without the commitment to act upon its results can delay change. Initiators should realize that they themselves are stakeholders in the programme and need to learn which changes of their own organization are required. In the programmes discussed, the relationship between strategic partners and the programmes was often reduced to an accountability relationship. In cases like TPLZ and New Gas, programme managers doubted whether programme commissioners (government, trade organizations) where actually willing to change policies as a result of programme findings. The Innovation Agenda Energy programmes were not judged on whether they succeeded in creating policy change, but by and large on the effect they had on *other* stakeholders.

The internal change process of governments and others cannot be delegated to the transition programme. It is advised to make active use of insights and results from the programme and respond accurately when the programme shows that (policy) changes are necessary. Although the programme needs to keep some distance to the initiating organizations to create space and freedom to experiment, there is a difference between a shadow track and being side-tracked.

Provide resources according to programme development

Budget should not be spent in full during the start of the programme. Especially programmes that use subsidies to attract change agents and projects will have little room to adjust projects once the subsidies are granted. This makes it difficult to change course or build upon new insights. As shown, programmes change their transition scenarios, portfolio and

network during programme development. To do that, they need resources. The programmes ability to attract a range of new resources is a sign of commitment of change agents and therefore of success. It would be wise to finance transition programmes for example bi-annually depending on their ability to show progress in terms of resources and goals.

Choose an explicit strategy

A clear choice for a transformative or visionary strategy helps programme management prioritize activities. As shown, programmes develop differently based on the strategy they employ. Accountability measures and timing should be based on this. For example: early in programme deployment, transformative programmes can be held accountable for the innovativeness and quality of their transition experiments, while visionary programmes should be able to demonstrate the added value of their vision and the way this is reflected in their experiments and tactical activities.

Create and connect

Programme managers should resist the urge to focus too much on individual projects. The added value of a programme and the task of programme managers is to provide synergies across levels, actors and projects. This means creating a network and portfolio that connects actors within the programme with those outside the programme, between general transition field dynamics and local projects, between long term transition scenarios and short term actions and between the participating projects.

Be clear on what needs opening up and what needs closing down

The cases show that both opening up and closing down are necessary for problem structuring but on different aspects and at different points in time. Programme managers are responsible that it is clear to project leaders, strategic partners and others what the programme is about and what not (closing down) and which themes are open for exploration (opening up).

Be more than a programme implementer

When the transition alternatives developed by the programme become clear, programme managers need to champion them. Programme managers represent a programme with a mission, an advocacy coalition. This is quite different than ‘merely’ implementing a program on behalf of the donors.

RECOMMENDATIONS FOR MONITORS AND EVALUATORS

Ask big, but focus data collection

The strength of the broad monitoring framework is that it forces programme management to regularly ask important questions. By and large such questions concern different levels and dimensions. For example, do not just check whether there is a transition scenario, but also ask how projects fit this scenario and how it relates to other scenarios in the transition field (see chapter on TransForum). However, it will be inefficient to actively collect all the information yourself. It may even be counterproductive when it leads to an overflow of data and evaluation fatigue of stakeholders. Using the TMon approach requires a rudimentary monitoring system in order to have an overview of the flow of projects and actors involved, connect and use other information flows as much as possible, ask key questions based on the framework and only do additional data collection on the key aspects at a particular point in time.

Choose a specific mode of co-production

Co-production is key for creating credible, salient and legitimate suggestions for programme development. However it is neither easy nor without tensions as shown in different cases. The typology of different modes of monitoring helps to manage the expectations of programme managers and external experts on their role in the monitoring process and prevents problems later the process. Co-production does not mean being uncritical, but it is a move away from being a fully detached observer.

Use and modify at will

The different cases present monitoring prototypes for a range of topics. Even though none of these are without flaw or are already robust, other monitors and scholars are invited to build upon them. Some prototypes that might serve your purpose: the monitoring matrix for transition experiments (chapter 6), the three aggregated indicators for monitoring transition scenario development (chapter 7), identifying multiple transition scenarios in the transition field to flesh out the different transition dynamics (chapter 8), the innovation system indicators (chapter 9), the format for monitoring visionary innovation programmes (chapter 9) and of course the revised TMon approach for transformative programmes (this chapter).

Nothing as practical as salient transition theory

Transition studies aim to understand the dynamics and governance of transition processes better but also want to contribute to policy and change agents directly. Using transition theories helps to provide focus and interpret the results, but the case studies also show that the theory used needs to resonate with (be salient to) programme managers. This means that transition studies can only contribute to programme development in practice when there are programmes based on similar ideas.

RECOMMENDATIONS FOR FURTHER RESEARCH

The TMon approach proved versatile and relevant, but remains quite generic. The following three suggestions for further research may offer interesting research opportunities: cross-case comparison (or meta-evaluation), the use of more rigorous and sophisticated methods, and rethinking the nature of information flows in networked programmes.

More research is necessary to answer the key question for transition management: "*what kind of coordination, actors and interventions are most relevant and effective given particular transition dynamics*?". An appropriate methodology would be (realist) meta-evaluation (Pawson 2001), as was used in chapter 4 to integrate the findings of the initial monitoring applications. Two levels of meta-evaluation or cross-case comparison spring to mind: a comparison between transition programmes and a comparison between different governance arrangements (eg market, legislation, sector agreements, programmes). As mentioned meta-evaluation of different transition programmes based on co-production would require a set of programmes working according to a similar logic.

The TMon approach to date did not have the full methodical benefits of a range of relevant and sophisticated M&E methods developed within transition studies and elsewhere. A second suggestion is therefore to make more use of some monitoring and evaluation methods that I was not in the position to implement in this research. Even though the nature of transition programmes calls for versatility, multi-method designs, etc., it should be possible to develop a manageable set of monitoring methods or building blocks that are more easy to use in practice. As a spin-off, it would strengthen transition studies as a whole by stimulating methodological refinement and relations to other fields of study.

There is no need to develop completely new methods and methodologies. Over the past two decades there has been a steady growth of articles in evaluation journals on the topic of networks and complexity and a community of evaluators using complexity-based methodologies is forming. It is more a matter of connecting existing state of the art methods to the conceptual richness of middle-ranged transition theories. Within the community of transition researchers, a focus on methods opens up new opportunities for discussion and collaboration (at least this was my experience in the 2006-2007 discussion forum on transition monitoring). Some of the noteworthy methods developed in this community are ESTEEM (Raven, Jolivet et al. 2009), Reflexive Process Monitoring, (van Mierlo, Arkesteijn et al. 2010) and ILA Monitoring (Regeer, Hoes et al. 2009). These methods are used at the project level. Outside this community, collaborations can especially be sought with development studies. Many development programmes aim to influence complex change processes and acknowledge that their challenge is not fully structured. In this sense they are similar to transition programmes and may benefit from transitions thinking and TMon. Transition studies could in turn benefit from their extensive experience in trying to change social systems and their often robust, yet down-to-earth M&E methods like the Most Significant Change approach (Dart and Davies 2003)], outcome mapping (Earl, Carden et al. 2001) and a range of participatory methods (Abbot and Guijt 1998). Other interesting, but more demanding methods are data-mining techniques to identify the typical statistical signature of changes in complex systems and bottom-up social science methods like the Repertory Grid Technique and Q Analysis (also used in chapter 4) to identify, reflect upon and monitor the often implicit perspectives and mental categories of change agents about transition scenarios and sustainability effects.

The third suggestion is to explore a fundamentally different idea on information processing in transition programmes. TMon is based on the idea that one has to select, collect, aggregate and integrate as much as possible all relevant information in a central location (the monitoring team) to make decisions on programme development. The initial metaphor for this was that of a cockpit in which pilots (the monitoring team) steer the plane (develop steering suggestions for programme development) by looking at the meters on the dashboard (the aggregated indicators). Such a central 'cockpit' does not fit well with the logic of information processing in networks. In networks, agency and knowledge

are not located at a single location but dispersed throughout the network. To operate effectively in a network does not require a full overview of all the information in the network, as long as you are in contact with people who may have relevant information. Apart from the feeling that the 'central information and control' idea seems a bit outdated (very web 1.0 instead of web 2.0 so to speak) it may therefore be against some of the advantages of networked governance. Aggregating data from many sources (i.e. projects) always runs the risk of overlooking 'weak signals' that can be seen as the first symptoms of change and as such should be taken into account (Sondeijker 2009). Moreover, in cases like New Gas, RCI and the Innovation Agenda Energy, it was not at all clear who was the central programme manager and thus who should define the programme and transition field and be included in the monitoring team. TMon '2.0' may have some of the following characteristics: no central monitoring team; the entire programme network has access to all information and actively contributes, selects and uses this information; there are no or very few preset criteria what type of information is essential by programme managers or transition experts; and, information is as much as possible high in detail and low in aggregation. Apart from the challenge of getting such a system to work (ie that it does not become an on-line community with no activity or an extensive but little-used database), it raises interesting research questions and may generate highly innovative monitoring and evaluation. Research questions would include how such information may be processed to generate steering suggestions, what credibility, salience and legitimacy means in this context, which scientific norms are appropriate (and which not) and if and how you can use transition theories if you cannot control the data-flows.

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APPENDIX: Q METHOD

Early 2008 the transition experts and programme managers were interviewed and asked to fill in a questionnaire. The interview and questionnaire covered a range of items about their personal evaluation of the monitoring. These topics included:

- the influence of programme managers and experts in different stages of the monitoring process,
- whether the monitoring addressed the needs of the programme,
- whether recommendations were formulated and whether they were implemented
- the speed of the monitoring progress and required programme resources
- whether the composition and expertise of the monitoring team was sufficient
- the learning process as a result of monitoring.

The results of the evaluation of the monitoring pilots are described in the next section.

Q Methodology is an approach to study people's subjectivity (Brown, 1980). For a description of Q, we draw upon Cuppen (2010). According to her, Q Methodology can uncover frames without imposing predefined categories. This means that no presumptions were made regarding the views of programme managers on transition monitoring. Q methodology comprises several stages. The first stage is the definition of the 'concourse': the full range of discussions and discourses on the particular issue under study. The concourse about transition monitoring has been based on the discussions and minutes of four meetings during 2006 and 2007 in which a community-of-practice on transition monitoring discussed the nature, current activities, functions and challenges for transition monitoring. In this community of practice both scientists and programme managers participated. From the concourse, a large set of statements is derived in the second stage of Q methodology. These statements should reflect the diversity of the concourse. The discussions in the community of practice on transition monitoring included a wide range of topics, like the nature of the knowledge that should be produced in transition monitoring, the role of external experts and programme management in the monitoring, and the role of programmes in stimulating a transition. A set of 32 statements was constructed that addressed this range (see table 3.1). The third stage concerns the identification of a group of respondents. These are the five programme managers, most closely involved in the different pilots. In the fourth stage, these programme managers performed the Q sort, which means that ranking the statements on a scale ranging from 'this is exactly how I see transition monitoring in my programme' to 'this doesn't describe the role of transition monitoring in my programme at all". The statements were sorted according to a normal (bell-shaped) distribution. The statements were sorted in seven columns across the scale, in which only two statements could be placed at both extremes, while increasingly more statements could be placed towards the middle of the scale (column 4). In this middle column 8 statements could be positioned that the programme considered neither especially relevant nor irrelevant. programme managers were encouraged to tell during the sorting why they positioned statements in a certain way- this helped to interpret the factors. The fifth stage consists of a factor analysis of the resulting data, resulting in clusters of Q sorts that are similar in their

rankings of the statements, i.e. high correlation. These clusters can be interpreted as frames on transition monitoring and are described in the next section. The typical way to interpret a factor in Q methodology is to look at the statements with the strongest agreement and disagreement for that factor. In addition, the statements that distinguish most between one factor and the other factors are useful in interpreting a factor because these indicate how a factor is different from the other factors.

Table 0-1Statements about transition monitoring used to determine the programme's framing of transition monitoring

Statements about transition monitoring used in the Q analysis
1. Monitoring is an important tool to provide signals to policy makers to address barriers that we encounter in our programmes. 2. You can only determine how you can improve a project or programme when you have set concrete and clear goals beforehand. 3. Without a clear vision on sustainability and the desired transition, a programme can exert little focused influenced and transition monitoring is not useful. 4. Transition monitoring identifies the (potentially) successful projects, approaches and concepts in the programme. 5. Transitions and innovation programmes are hard to capture fully. We can therefore better start with what we have now and shape the monitoring process as we go along. 6. Transition monitoring creates knowledge on barriers, solutions and strategies within projects. 7. Active participation of project and programme members results in better recommendations and is therefore essential. 8. Transition monitoring should generate insight on how to involve the right actors and networks. 9. As an intermediary organization you cannot do a lot more than developing innovative concepts that trigger dynamics and discussion. 10. Knowledge is not (only) transferred by reports but especially by sending out people into the field with some tips and feeding them continuously with stories from the experiences of others. 11. Transition monitoring should provide insight in the diffusion of new knowledge, insights and experiences: who are we reaching and what do they do with it? 12. Monitoring should provide a sense of proportion: the impact of a programme is only small compared to the larger developments in the sector. 13. Of course there is an implicit view on interesting projects, but a checklist to determine which projects are interesting is not meaningful. Typically, such a list is outdated the moment you write it down. 14. Transition monitoring is directed at projects to generate insights for the programme about its role and which projects require additional support. 15. A programme clarly does more than supporting knowledge transfer from science to practice. It is an organization that creates new links, delivers tailored support and influences process, content and the network. Transition monitoring should support this role. 16. Monitoring requires a basis for trust between programme management and external experts. This trust needs to develop over time. The programme manager therefore has a large influence on the monitoring. 17. Transition monitoring helps identify which aspects of the regime obstruct change and how to deal with them. 18. The programmes activities should be representative for the change it seeks: if the desired system is based on new actors, technologies etc, these should be part of the projects and programme. 19. To me, the primary function of monitoring is to show whether desirable changes are happening and if problems surface that should be put on the agenda. 20. Monitoring and management are very much intertwined. The programme manager therefore has a large influence on the monitoring and vice versa. 21. Stimulating a reflective process through transition monitoring is at least as important as getting tangible results. 22. Inflexible output monitoring may lead to perverse effects in which the outputs are maximized, while the question if the programme is really working on relevant things moves to the background. 23. Transition monitoring helps to transfer relevant knowledge between projects. 24. The role of KSI is to base transition monitoring as much as possible on scientific sources, quantitative information and its own expertise. Programme management has an influence, but no definitive voice in the set-up, focus or conclusions. This way monitoring can best provide a critical mirror to the programme. 25. An objective observational role of researchers results in a better view of the transition a programme contributes to, but offers less practical recommendations. 26. Monitoring offers insight in the complexity, by reducing it to clear figures and indicators. 27. It is essential to involve the entire programme management in the monitoring activities, because they would otherwise miss important learning opportunities and may oppose recommendations. 28. By conducting all the pilots in a similar fashion, we as a programme can learn from other programmes. 29. Cohesion and cooperation between projects is a task for programme management and transition monitoring helps to improve this. 30. I think transition monitoring should always make the relation between projects, the programme and social changes. 31. Monitoring can never make a causal relation between the programme and its potential future impact on society. This is not a shortcoming of monitoring but a fact of life. 32. Transition monitoring should offer insight in the concrete results of projects and the programme that have an effect on the transition process.

SUMMARY

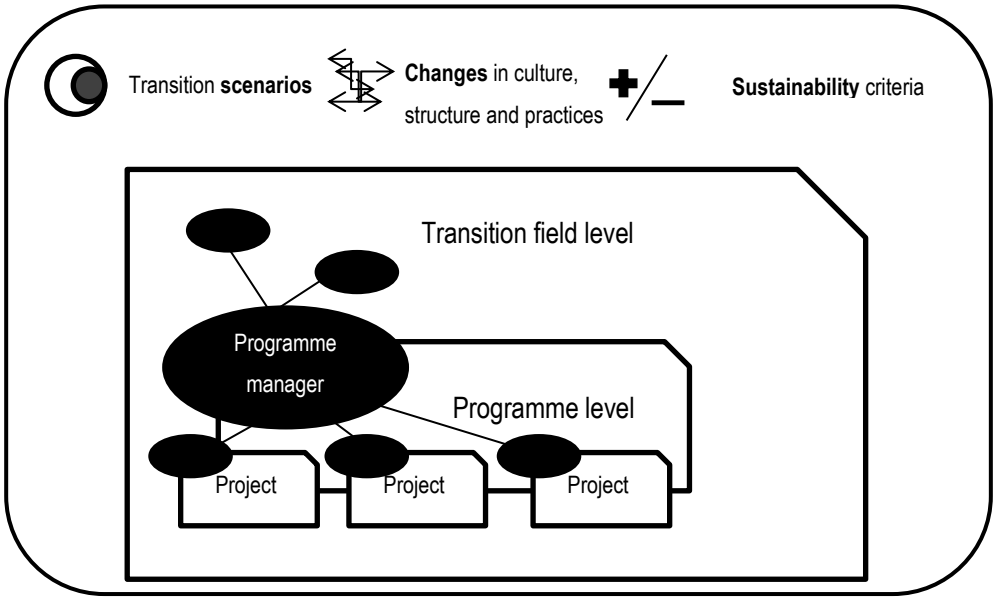
Most monitoring and evaluation approaches have been developed for structured problems in which goals and means are known. This is not the case for the problems that are central to sustainability programmes. These are oriented towards long-term fundamental changes (transitions) in society. Such transition programmes are set up because transitions pose unstructured problems, for which there is no consensus amongst stakeholders on the type of transition that is desirable and feasible, nor on the means necessary to realize them. The goals and means of the programme will change over time, as a result of learning and programme development. The idea that transition programmes have a problem structuring function is the starting point. This research aims to design a monitoring approach for programme managers who develop such transition programmes. The approach is referred to as transition monitoring.

Sustainability transitions are long-term change processes in which the culture, structure and practices within society change fundamentally over a period of one or two generations to make society substantially more sustainable. These are complex change processes in which -especially in early phases- uncertainties are high, existing structures change, and coordination between many interventions is necessary. This is why dedicated sustainable transition programmes and networks are being created.

Transition programmes often do not have very concrete goals when they are initiated. This complicates monitoring and evaluation (M&E) of these programmes and as a result many conventional M&E approaches fall short. At the same time, dealing with unstructured sustainability problems requires continuous learning and programme adjustment by programme managers, for which appropriate monitoring and evaluation are essential.

This dissertation seeks a way out of this paradox by no longer asking whether programmes *realize* their goals with their chosen means –i.e. the question that conventional M&E approaches address-, but whether programmes *create* goals and means for networks of change agents to further a sustainability transition.

Transition programmes are continuously engaged in a process of searching, experimenting and learning. This process takes place with respect to different dimensions: transition scenarios (problem framing, visions, strategies), sustainability criteria and concrete structural and cultural changes. For each of these dimensions the interplay between developments at different levels forms the basis to assess their importance. The levels are the project-level, the programme level and the transition field level in which the programme operates. This results in a broad framework for transition monitoring (see figure).



The strength of this broad framework lies in its versatility. By focusing on different levels and dimensions monitoring becomes both an instrument to determine whether change develops as expected but also a process instrument to systematically discuss with stakeholders whether the right expectations have been formulated and which new insights require changes in the programme. The framework offers more reference points to interpret developments than conventional M&E approaches. For example, it raises the question how emerging transition scenarios at the project level relate to the dynamic transition scenarios in the wider transition field, or how unexpected changes in culture, structure and practices give rise to new sustainability issues. This versatility is welcome when standard reference points for indicators (like a baseline, control group or distance to target) cannot be used, because the goals themselves evolve over time. The downside of such a broad framework and a recurring discussions on indicators is that it can make the already challenging task of monitoring complex transition processes even more challenging.

The majority of this thesis is therefore devoted to searching for ways to implement the monitoring framework in a way that is useful for programme management. This is based on a dual approach, rooted in both practice and theory. On the one hand specific transition monitoring applications have been designed and implemented with different programme managers and transition experts in a bottom up fashion. Different (transition) theories have been used to guide these monitoring processes. On the other hand, different monitoring applications are compared to flesh out generic patterns and heuristics to strengthen the overall monitoring approach.

The context of this research is described in chapter one. It argues transition monitoring should support on-going programme development. The (explorative) research questions are: (1) What are key challenges that should be addressed in the design of a transition monitoring approach? (2) How can these be translated into a monitoring approach? And (3) what can we learn about this monitoring approach through its application in different cases?

Chapter two describes the design methodology. The design takes place in two cycles, in which a general monitoring approach is applied to different transition programmes, leading to revisions of the general approach. Transition experts and programme managers co-produce the monitoring applications. Co-production is expected to enhance the usefulness of the approach, take advantage of both the in-depth knowledge of programme managers and transition experts' more

generic methodological and theoretical knowledge and, finally, to enhance the legitimacy of the approach given the uncertainties and high stakes associated with sustainability and transitions. The two design cycles are connected to the research questions.

Chapters three to five describe the first design cycle. Chapter three empirically identifies key challenges for transition monitoring (first research question). A preliminary monitoring framework was piloted in five different transition programmes. The pilots resulted in different monitoring applications with different degrees of success. Through a realist meta-evaluation, the pilots were evaluated to learn why particular activities were (un-) successful in different programme contexts. The results confirm the importance of co-production and monitoring different levels and dimensions, but also show how difficult it is to provide focus to the monitoring. The meta-evaluation of the pilots identifies five challenges that need to be taken up in a revision of the transition monitoring approach: (1) relating developments at different levels and dimensions (2) transition monitoring for programmes with different strategies, (3) adapting to changing monitoring needs, (4) accommodating different views of co-production and (5) criteria to evaluate the fit and value of transition monitoring for a programme.

Chapter four and five address these five challenges, resulting in a modified monitoring approach (second research question). Chapter four discusses the framework in light of transition studies and presents a transition theoretical toolkit that different transition monitoring applications can draw upon. Based on a typology of entrepreneurial strategies, four programme strategies are identified of which two are appropriate for transition programmes. These are visionary and transformative strategies. Visionary strategies match the strongly systems and vision-based transition management, whereas transformative strategies match the 'bottom-up' approach of programmes that start with local experiments. Both strategies result in different programme development issues over time, and therefore different monitoring needs. Monitoring can inform programme development through two types of appraisal: opening up and closing down. Opening up especially facilitates reflection. Monitoring stimulates a process of opening up when it shows the diversity of interpretations of the current situation. In particular by articulating and confronting different transition scenarios, perceived barriers and opportunities and sustainability issues. Closing-down reduces complexity, focuses resources and attention, and facilitates action by converging towards a single transition scenario and associated set of change and sustainability indicators. Both processes require a different type of monitoring. In combination with theory on science-policy interaction, this results in four modes of monitoring that describe the type of appraisal and role of transition experts, programme managers and other programme stakeholders: (1) programme-wide reflection, (2) external reflection, (3) operational management information and (4) testing. The value of transition monitoring can be evaluated by whether it is perceived as credible, salient and legitimate.

Based on the pilots and the theoretical chapter, the preliminary monitoring approach is revised in chapter five. The revised approach consists of the general framework, different modes of monitoring and a general monitoring process. The levels and dimensions in the framework give rise to two basic steering heuristics for programme development. The first is that programmes should realize changes in practices, culture and structure in the direction of a transition scenario that is sustainable. The second is that projects should form a coherent and diverse portfolio that is relevant to, and influences, the transition field. The four modes of monitoring describe the purpose of monitoring (opening up or closing

down) and who is responsible for different parts of the monitoring process (programme managers or experts). The monitoring process consists of a recurring cycle of programme description, focusing, observation and interpretation. Each monitoring cycle results in a new description of the programme, projects and transition field. These regularly redefined descriptions provide an account of programme development.

Chapters six tot ten comprise the second design cycle. They analyse the implementation of the transition monitoring approach in different Dutch transition programmes. In chapter six, the monitoring framework is applied to a transition programme in health care, focusing on transition experiments, both individually and on a portfolio level. This application was considered useful especially at the start of the programme. Over time its orientation towards opening up became less relevant, as the experiments were in a process of closing down. Chapter seven describes the monitoring activities in a programme in agriculture. It contributed to the development of a programme level transition scenario by continuously providing feedback to the programme with respect to its relation to other transition scenarios at project and transition field levels. Chapter eight monitored the transition dynamics in the Dutch gas natural system for platform New Gas. It shows how the sector changed with respect to five different transition scenarios and how each change is associated with different sustainability issues and transition patterns. This helped the platform to reformulate its own transition scenarios and reflect on its strategy, composition and relation to other transition programmes. The case study in chapter nine describes transition monitoring for the Innovation Agenda Energy. This agenda consisted of 30-40 innovation programmes for which an overarching monitoring approach was designed. Although this case is limited to the monitoring design (its implementation fell beyond the time scope of this research), this design does indicate how a comparable monitoring format may be used for comparable programmes and how information can be aggregated on different levels. In the final case in chapter ten, the monitoring approach was applied to an ambitious regional programme to mitigate climate change. In this case study transition monitoring failed. This could be explained in retrospect by a lack of agreement over the required mode of monitoring, conflicts over whether a transition management frame was a legitimate frame to analyse this programme, and the planning-based (as opposed to visionary) strategy of the programme. After initial failure, monitoring activities were modified to better match the programme context but in which the transition monitoring approach was no longer recognizable.

Chapter 11 first summarizes the answers to the first two research questions. Cross-case comparison of the second cycle of monitoring applications results in lessons about key features of the transition monitoring approach. Notably:

- Transition theories are useful as long as they are already used in the programme because of the normative implications of transition theories and the high level of detail needed for credible monitoring.
- Transformative and visionary programmes develop differently and should be monitored accordingly. Different strategies result in a different programme management priorities over time and hence different monitoring questions.
- Different modes of monitoring are needed over time. The typology of different modes of monitoring was a good basis to discuss and agree on the function and roles of experts and programme managers in transition monitoring. The cases show that opening up and closing down was necessary on different aspects and in different points in time.

- Transition monitoring is needed to link project to transition field dynamics. Just like programme managers form a link between projects and the larger transition field, transition monitoring needs to link up both developments.
- Flexibility benefits from a stable framework. Keeping the general characteristics of the monitoring design (like the theoretical perspective and aggregated indicators) the same, is likely to make redesign more acceptable and faster and provides continuity to the monitoring process and information.

The overarching lesson was that the monitoring approach contributed to different programmes and programme development issues and can be further specified by making use of recurring patterns of programme development. Based on the cases, a new version of the TMon approach was formulated for transformative programmes, which describes what type of monitoring is needed in which programme phase. It is discussed that the modes of monitoring of the TMon approach may be relevant for broader discussions about co-production and Mode 2 knowledge production. It is argued that rather than aiming for fully intertwined knowledge production by practitioners and researchers, transparency and quality can be better maintained by choosing for a particular mode of collaboration. The view of programming as a problem structuring process may also be used to rethink ex post evaluation of transition programmes. Ex post evaluation would then focus on the *creation* of goals and means rather than establishing proof of impact on the larger transition process. A series of recommendations is offered to initiators and managers of transition programmes, monitors and evaluators and transition researchers.

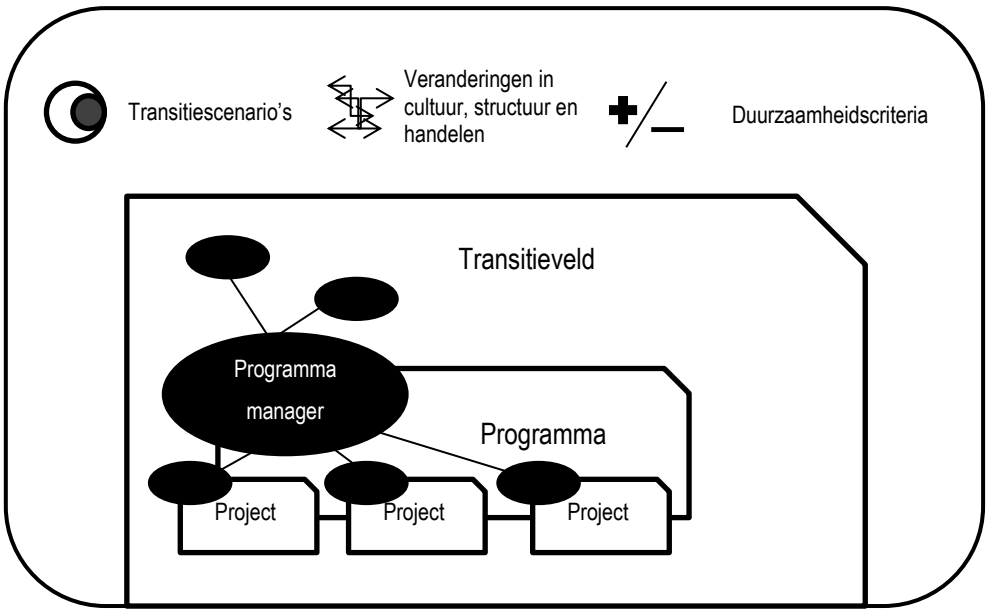
SAMENVATTING

De meeste monitoring en evaluatie-aanpakken zijn ontwikkeld voor gestructureerde problemen waarbij de doelen en middelen om deze te adresseren bekend zijn. Dit is echter niet het geval voor de problemen die centraal staan in duurzaamheidsprogramma's. Deze streven een fundamentele, lange-termijn verandering van de samenleving, oftewel een transitie, na. Je zou zelfs kunnen stellen dat dit soort programma's juist nodig zijn vanwege het ongestructureerde karakter van dit soort fundamentele veranderingen. Het ongestructureerd karakter uit zich in een gebrek aan zicht op welke transitie wenselijk en haalbaar is en welke middelen nodig zijn om deze te realiseren. Doelen en middelen zullen zich dus over de tijd heen ontwikkelen als gevolg van het experimenteren en leren binnen een programma. De gedachte dat transitieprogramma's een probleemstructurerende functie hebben is daarbij uitgangspunt. Het doel van dit onderzoek is om een monitoringsaanpak te ontwerpen voor managers van dit soort transitieprogramma's om hen in dit proces te ondersteunen. Deze aanpak wordt transitiemonitoring genoemd.

In een duurzaamheidstransitie veranderen cultuur, structuur en handelen in een samenleving. Dit is een complex web van veranderingsprocessen waarin met name in het begin de onzekerheden groot zijn. Om coördinatie en samenhang tussen verschillende interventies te versterken worden nieuwe programma's en netwerken opgezet. Dit soort programma's hebben vaak niet heel concrete doelen aan het begin. Dit maakt monitoring en evaluatie lastig. Tegelijkertijd zijn er continue leerprocessen en interventies nodig om het programma te ontwikkelen. En daarvoor is weer informatie nodig over lopende ontwikkelingen en lessen, oftewel monitoring.

Dit onderzoek zoekt een uitweg uit deze paradox door niet zozeer te monitoren of programma's hun doelen met de voorgenomen middelen *bereiken*, maar of ze doelen en middelen *creëren* voor een netwerk van partijen dat daarmee samen een bepaalde duurzaamheidstransitie na kan streven.

Het experimenteren en leren binnen programma's vindt plaats op drie niveaus: het niveau van het transitieveld (de sector of regio waarbinnen een transitie wordt nagestreefd), het niveau van het netwerk en portfolio van het programma als geheel, en het niveau van afzonderlijke projecten. Ook heeft het betrekking op drie dimensies. Zo wordt geëxperimenteerd en geleerd over transitiescenario's (handelingsperspectieven voor de langere termijn), concrete veranderingen en duurzaamheidseffecten. Het is met name de samenhang tussen al deze ontwikkelingen die mogelijkheden oplevert om het programma te verbeteren. Bijvoorbeeld: levert een project nieuwe kansen op, wat is de bredere dynamiek waarbinnen deze kansen gepakt kunnen worden en hoe kan het programma hier aan bijdragen? Het resultaat is een breed raamwerk voor transitiemonitoring (zie figuur).



De kracht van dit brede raamwerk is zijn veelzijdigheid. Het is op allerlei programma's en sturingsvragen toe te passen. Door op verschillende niveaus en dimensies te monitoren en de resultaten te bespreken draagt de monitoring bij aan het bepalen of gewenste veranderingen plaatsvinden, maar is het ook een manier om met betrokkenen te bediscussiëren of de juiste verwachtingen zijn geformuleerd en welke inzichten vragen om aanpassingen aan het programma. Doordat ontwikkelingen op verschillende niveaus en dimensies aan elkaar gekoppeld kunnen worden, ontstaan meer mogelijkheden voor bijsturing. Het nadeel van dit brede raamwerk is dat het weinig specifieke houvast geeft over wat wel en niet relevant is en daardoor tot discussie kan leiden.

Daarom is het grootste deel van het onderzoek gewijd aan hoe deze monitoringsaanpak toegepast en aangescherpt kan worden, zodat het bruikbaar is voor programma management. De aanpak is tweeledig. Allereerst is het raamwerk, samen met programmamanagers, toegepast in verschillende programma's. Hierbij zijn verschillende theoretische kaders gebruikt. Vervolgens zijn de toepassingen met elkaar vergeleken om algemene uitdagingen en patronen te identificeren. Met behulp van theoretische inzichten uit verschillende wetenschappelijke velden heeft dit geleid tot een aanscherping van de aanpak.

Hoofdstuk 1 beschrijft de context van dit onderzoek. Het beargumenteert dat transitiemonitoring belangrijk is voor het doorlopend verbeteren van een programma. De exploratieve onderzoeksvragen zijn: (1) wat zijn de grootste uitdagingen die geadresseerd moeten worden in het ontwerp van transitiemonitoring? (2) Hoe kunnen deze vertaald worden in een generieke monitoringsaanpak? En (3), wat kunnen we leren van het toepassen van deze aanpak in verschillende cases?

Hoofdstuk 2 beschrijft de ontwerpaanpak. Deze bestaat uit twee cycli waarin telkens een versie van de generieke aanpak voor transitiemonitoring wordt toegepast in verschillende programma's, de resultaten vergeleken worden en een nieuwe versie wordt ontwikkeld. De twee ontwerpcycli zijn gekoppeld aan de onderzoeksvragen. Er is gekozen voor een aanpak vanuit de praktijk waarin experts samen met programmamanagers een specifieke toepassing ontwikkelden en implementeerden. Het verwachte voordeel van deze co-productie was dat hierdoor de aanpak aan bruikbaarheid voor de praktijk zou winnen, dat zowel de praktijkkennis van de programmamanagers als de theoretische en methodologische

kennis van experts optimaal benut kon worden en de toepassingen zouden winnen aan legitimiteit gezien de normatieve keuzes en implicaties bij de toepassing van transitiemonitoring.

Hoofdstukken 3 tot en met 5 behandelen de eerste ontwerpcyclus. Op basis van een vijftal pilots identificeert hoofdstuk 3 vanuit de praktijk uitdagingen voor transitiemonitoring. Dit is de eerste onderzoeksvraag. De pilots waren onderling tamelijk verschillend en waren in verschillende mate succesvol. Via een 'realistische meta-evaluatie' is gekeken hoe verschillende monitoringsactiviteiten in de verschillende programmacontexten tot bepaalde resultaten hebben geleid. De resultaten bevestigen de basisaannamen dat op verschillende niveaus en dimensies gemonitord dient te worden en dat co-productie essentieel is. De vijf uitdagingen zijn: (1) het koppelen van ontwikkelingen op verschillende niveaus en dimensies (bijvoorbeeld met gebruik van transitietheorie), (2) de aansluiting bij verschillende programma strategieën, (3) het aanpassen van de monitoring aan de veranderende informatiebehoeften, (4) de aansluiting bij verschillende beelden over wat co-productie in de praktijk inhoudt en (5) criteria om de aansluiting tussen monitoring en het programma te evalueren.

Hoofdstuk 4 en 5 geven met behulp van theoretische inzichten de eerste aanzet om met deze uitdagingen om te gaan en beantwoorden daarmee de tweede onderzoeksvraag. Dit resulteert in een aangepaste monitoringsaanpak. Hoofdstuk 4 bediscussieert eerst het raamwerk vanuit transitiestudies en presenteert een theoretische gereedschapskist voor verschillende delen van het raamwerk die in verschillende programma's toegepast kan worden. Twee verschillende programmastrategieën worden afgeleid vanuit een typologie van ondernemerstrategieën. In het geval van een 'visionaire strategie' begint een programma met een visie en sluit aan bij het sterk visie-gedreven transitiemanagement. 'Transformatieve strategieën' starten bottom-up vanuit kleinschalige radicale experimenten. Elke strategie heeft zijn eigen managementprioriteiten in verschillende fasen van een programma en daardoor verschillende monitoringsbehoeften. Een centraal onderscheid is het gebruik van monitoring om programmamanagement inzicht te geven in verschillende invalshoeken ('opening up') ten behoeve van reflectie, of inzicht in kernindicatoren ('closing down') om focus te bieden. Gecombineerd met theorie over de interactie tussen wetenschap en beleid (in dit geval tussen transitie-experts en programmamanagers), leidt dit tot vier verschillende vormen van monitoring: programma-brede reflectie, externe reflectie, testen en operationele management informatie. De aansluiting van de monitoring bij het programma wordt bepaald door de betrouwbaarheid, bruikbaarheid en legitimiteit van de monitoring.

Hoofdstuk 5 vertaalt deze inzichten in een nieuw versie van de monitoringsaanpak. Deze bestaat uit drie onderdelen. Het raamwerk voor indicatoren, de verschillende vormen van monitoring en een cyclisch monitoringsproces. Het raamwerk leidt tot twee algemene heuristieken voor programmamanagement. De eerste heuristiek is dat projecten een coherent en divers portfolio dienen te vormen dat relevant is ten opzichte van de dynamiek in het transitieveld en hieraan bijdraagt. De tweede heuristiek is dat het programma veranderingen moet realiseren in de richting van een transitiescenario dat duurzaam is. Met behulp van transitietheorie en prioriteiten van programmamanagement op dat moment kunnen deze heuristieken verder geoperationaliseerd worden. De vier vormen van monitoren beschrijven het doel, de bruikbare methoden en de rolverdeling tussen programmamanagers en experts van buiten. Het monitoringsproces bestaat uit een cyclus waarin eerst het programma wordt beschreven met behulp van het raamwerk, vervolgens wordt gekozen voor onderwerpen waar extra informatie over nodig is, vervolgens het interpreteren van deze informatie in het kader van het raamwerk en het formuleren van aanbevelingen. Over tijd leidt dit weer tot een

aangepaste programmabeschrijving. Deze telkens aangepaste programmabeschrijvingen vormen uiteindelijk een verslag van de ontwikkeling van het programma.

Deze monitoringsaanpak is vervolgens toegepast in vijf Nederlandse programma's. Dit vormt de tweede ontwerpcyclus. Hoofdstuk 6 beschrijft het reflectieve monitoren van transitie-experimenten binnen een programma rond langdurige zorg. Met name aan het begin van het programma was dit succesvol. Hoofdstuk 7 monitort het proces van visieontwikkeling binnen een programma rond duurzame landbouw. Monitoring droeg bij aan deze visieontwikkeling door in verschillende stappen informatie over visies binnen projecten en de landbouwsector naast de zich ontwikkelende visie van het programma te plaatsen. Hoofdstuk 8 richt zich op het monitoren van de transitiedynamiek in de gassector. Het laat zien hoe dit transitieveld zich ontwikkelt langs verschillende transitiescenario's. Het transitieprogramma werd hierdoor geholpen om haar eigen scenario's aan te scherpen en te communiceren en te reflecteren op haar strategie, samenstelling en relatie tot andere programma's. Hoofdstuk 9 beschrijft het monitoringsontwerp voor 30 tot 40 innovatieprogramma's rond duurzame energie. Deze programma's gebruikten allemaal dezelfde innovatietheorie. Dit maakte het mogelijk om een gemeenschappelijk monitoringsontwerp te maken, waarbij informatie op verschillende niveaus geaggregeerd kan worden. Bij een regionaal duurzaamheidsprogramma beschreven in hoofdstuk 10 is de transitiemonitoring mislukt. Dit kon achteraf verklaard worden door een gebrek aan overeenstemming over de gewenste vorm van monitoring, conflict over de vraag of het transitiemanagementkader het juiste kader was om het programma mee te beschrijven en de meer planmatige in plaats van visionaire strategie van het programma. Na initiële conflicten is de monitoring aangepast zodat het beter aansloot bij het programma maar de transitiemonitoringsaanpak was daarin weinig zichtbaar meer.

Hoofdstuk 11 vat eerst de antwoorden op de eerste twee onderzoeksvragen samen. Vervolgens vergelijkt het de verschillende cases uit hoofdstuk 6-10 om lessen te trekken over transitiemonitoring. De voornaamste lessen zijn: :

- Transitietheorie helpt om de monitoringsaanpak toe te passen. Echter alleen als de theorie ook al breder in het programma gebruikt wordt, vanwege de normatieve aspecten van de theorie en de grote mate van overeenstemming die nodig is in het monitoringsteam om tot goede indicatoren te komen.
- Transformatieve en visionaire strategieën zijn herkenbaar binnen programma's en leiden inderdaad tot verschillende monitoringsbehoeften in verschillende fasen. Deze kunnen gebruikt worden om een meer toegesneden monitoringsaanpak te ontwikkelen voor verschillende strategieën.
- Door de tijd heen, heeft een programma behoefte aan verschillende vormen van monitoring. De typologie van vormen van monitoring helpt om aan het begin van elke cyclus overeenstemming te krijgen over de functie van monitoring en rolverdeling tussen experts en programmamanagers . Ook de focus binnen het raamwerk verschuift door de tijd.
- Transitiemonitoring is noodzakelijk om ontwikkelingen op projectniveau te verbinden aan ontwikkelingen binnen het transitieveld.
- Flexibiliteit is belangrijk, maar wel binnen een stabiel kader. Door algemene onderdelen van een monitoringaanpak, zoals geaggregeerde indicatoren en het gebruikte theoretisch kader, constant te houden

worden andere aanpassingen beter geaccepteerd. Dit biedt continuïteit aan het monitoringsproces en de verzamelde informatie.

De overkoepelende les is dat transitiemonitoring weliswaar bij kan dragen aan verschillende programma's, maar het ontwerp toegespitst moet zijn op specifieke patronen in programma-ontwikkeling en onderscheid dient te maken tussen transformatieve en visionaire programmastrategieën. Voor transformatieve strategieën is een dergelijk aangescherpt ontwerp gepresenteerd. De vormen van monitoring zijn ook relevant binnen de bredere discussie over Mode 2 kennisproductie. Er wordt gepleit om volledige verstrengeling van activiteiten binnen onderzoek en praktijk uit de weg te gaan, maar te proberen transparantie en bestaande kwaliteitscriteria te behouden door een specifieke focus op een bepaalde vorm van co-productie. Een laatste punt dat ter discussie wordt gebracht betreft het in deze studie genomen uitganspunt voor transitiemonitoring dat programma-ontwikkeling een vorm van probleemstructurering in de praktijk is. Deze gedachte is wellicht van nut voor het evalueren van transitieprogramma's. Kern van de evaluatie is dan of een programma erin geslaagd is om een coalitie te smeden die een gedeeld handelingsperspectief heeft op de langere termijn en de middelen ontwikkeld heeft om dit te bereiken. Het laatste hoofdstuk sluit af met een aantal aanbevelingen voor mensen die transitieprogramma's opzetten, managen en monitoren als ook suggesties voor verder onderzoek.

About the author:

Mattijs Taanman (1979) studied Technology and Society at the Eindhoven University of Technology with a focus on energy policy. In his Master thesis he developed a model for the diffusion of hydrogen technology. After this exploration

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